STATISTICAL ATLAS OF INDIA,

1886.

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PREPARED FOR THE COLONIAL AND INDIAN EXHIBITION, 1886.

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TABLE OF CONTENTS.

		PAGE
PREFATORY NOTE		5
CHAPTER	I.—PHYSICAL CONFIGURATION (*Map*)	7 & 8
,,	II.—GEOLOGY (*Map*)	9 & 10
,,	III.—RAINFALL AND CLIMATE (*3 Maps*)	11—14
,,	IV.—IRRIGATION (*Diagram and Table*)	15 & 16
,,	V.—DISTRIBUTION OF CROPS, FOOD-SUPPLY, AND FAMINES (*Diagram*)	17—22
,,	VI.—REVENUE AND RENT SYSTEM	23—26
,,	VII.—FOREST CONSERVATION	27—30
,,	VIII.—AREA AND POPULATION	31 & 32
,,	IX.—EMIGRATION (*Map*)	33 & 34
,,	X.—FOREIGN TRADE (*Diagrams*)	35—38
,,	XI.—FINANCE AND TAXATION	39—42
,,	XII.—PUBLIC INSTRUCTION	43—46
,,	XIII.—FEUDATORY STATES (*Map*)	47—50

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PREFATORY NOTE.

IN a paper by the present writer, which was last year read before the Society of Arts in London, a promise was given that at the Colonial and Indian Exhibition fuller statistics of the agricultural resources and circumstances of India than were then available should be furnished and illustrated by charts to be hung on the walls of the Indian courts. The charts have been produced. But the promise has, within the last few months, found a more thorough fulfilment than could at the time be expected in the publication by the India Office of the most complete summary of statistics concerning India yet compiled—a summary which will afford to any persons desirous of obtaining an intimate acquaintance with facts and figures concerning India the best available information relating to that country and its administration from the commencement of the century. The publication referred to is the 19th number of a series of statements annually issued by the India Office, exhibiting the "Moral and Material Progress and Condition of India."* And, although its eighteen predecessors are all of value to those who are interested in the country, yet this 19th number, published at the close of 1885 under the editorship of Mr. James Sutherland Cotton, is one of exceptional character and worthy of taking a place among the histories of India.

The "Statistical Atlas," less complete in detail and range of subject than Mr. Cotton's compilation, is intended only to give a general idea, to a great extent through the agency of maps, of the character of the country, its inhabitants and agriculture, with the addition of such statistics as may serve to illustrate its commercial and educational progress. The small scale on which the maps are drawn compels the elimination of many of the details which are to be found on the large Exhibition charts; but inasmuch as the object in view is only to exhibit the characteristics of India in broad lights and shades, the absence of detail will perhaps be no disadvantage.

The maps in the Statistical Atlas have been prepared and printed in the office of the Surveyor General of India at Calcutta under the special supervision of Lieutenant-Colonel Waterhouse, B.S.C., and Major Strahan, R.E. The chapters have been written in each case by officials who are specially conversant with the subject with which they deal, and have, with the exception of those mentioned below, been compiled in the Secretariat offices of the Government of India. The following chapters have kindly been contributed by the officers specified in each case:—

Chapter II.—Geology by Mr. H. B. Medlicott, A.M., F.R.S., F.G.S., Director of the Geological Survey of India.
Chapter III.—Rainfall and Climate by Mr. H. F. Blanford, F.R.S., Meteorological Reporter to the Government of India.
Chapter VII.—Forest Conservation by Mr. B. Ribbentrop, Officiating Inspector General of Forests.
Chapter XI.—Finance and Taxation by the Hon. Mr. Justice Cunningham, Puisne Judge, Calcutta High Court.
Chapter XII.—Public Instruction by the Hon. W. W. Hunter, LL.D., C.S.I., C.I.E., Director General of Statistics.

The 6th Chapter, on the Revenue and Rent System of India, has been reproduced verbatim from a memorandum contributed by Mr. W. G. Pedder, Secretary in the Revenue, Statistics, and Commerce Department at the India Office, to the Statement showing the Moral and Material Progress and Condition of India.

In addition to the maps intended to illustrate the several chapters of the Atlas, a map has been given at the end of the volume showing the railways of India and the position of her principal mineral resources.

E. C. BUCK,

Secretary to the Government of India in the Revenue and Agricultural Department;
Commissioner for India at the Colonial and Indian Exhibition, 1886.

* The work is procurable at the office of the Indian Economic Court at the Exhibition, or from the following Agents:—

Messrs. Hansard, 33, Great Queen-street, W. C., and 32, Abingdon-street, Westminster.
Messrs. Eyre and Spottiswoode, East Harding-street, Fleet-street, and Sale Office, House of Lords.
Messrs. Adam and Charles Black, of Edinburgh.
Messrs. Alexander Thom and Co., or Messrs. Hodgess, Figgis, and Co., of Dublin.

CHAPTER I.

PHYSICAL CONFIGURATION.

THE first thing necessary for a proper comprehension of the British Empire in Asia is that some correct idea should be formed of the size and extent of it. It will be useful therefore that in looking at the charts in this volume a persistent comparison should be made between the British Isles in the corner and the Indian Continent in the centre of each one of them, and that in this way some primary conception should be acquired of the extent of the Indian Empire. But this is not enough. For it must be remembered that, although compared with the British Isles, the African deserts and the Central Asian steppes are of enormous extent, yet when they are weighed as producers of material wealth against those little islands, their vast size does not bring down the scale. Hundreds of square miles of sand are not equal to one square mile of wheat, nor are innumerable acres of salt-plains worth one square yard of iron. In order, then, to gauge the wealth-producing value of a country, it is necessary to adopt some familiar standard of comparison other than that of mere area; and, as India is essentially a land of agriculture, it seems right to take as the measuring standard some well-known country which in cultivated area and density of population is not unlike India. No excuse perhaps is therefore needed for repeating a comparison which was made in the paper alluded to in the prefatory note and for choosing as a unit of measure the agricultural section of Egypt,—that is, Egypt Proper, exclusive of the desert and the Soudan. Public attention has recently been drawn to that country, and the public is accustomed to see maps of it, and has probably formed a fairly correct idea of its extent. Egypt has, moreover, the advantage of being in its agricultural population more like India than any other country west of the Suez Canal. Taking, therefore, Egypt Proper as a unit of measure, it may be first compared with the North-Western Provinces exclusive of Oudh. This Indian province is, for administrative purposes, marked off into five large and two small divisions, all of which are administered under one Lieutenant-Governor by officials called Commissioners. Now, assuming the population of Egypt to be 5,500,000 and its cultivated area to be 5,500,000 acres, which are approximately the figures given in Baron de Malortie's "Egypt" as those of the last year of Ismail Pasha's reign, we find that in cultivated area four out of the five large divisions of the North-Western Provinces are each equivalent to about four fifths of the Egypt unit, while the fifth division is an Egypt and a quarter. The statistics of population bring out similar results. Altogether, in cultivated area and population the North-Western Provinces are equivalent to about five Egypts. The little province of Oudh, which, as will be seen on an examination of the final map in this Atlas, is held like a ball in a cup by the North-Western Provinces, is as large as an Egypt and a half. Bengal would absorb no less than ten Egypts and the Punjab three and a half more; Bombay, with Sind, about the same; Madras, about eight Egypts; the Central Provinces in population less than two, but in cultivated area more than four, with a possible, if not probable, extension to eight Egypts. British Burma gives one Egypt, with a possible extension to several more. Assam, of which an Egypt and a half is cultivated now, can, it is believed, be expanded into at least four. Berar, less than an Egypt in population, exceeds it in cultivated area. So far the British provinces. We need not venture into the area of the Native States and of the large number of Egypts which they would absorb; but some judgment may be formed of their size by comparing the space which they occupy on the final map in this atlas with that taken up on the same map by British Provinces.

Such a comparison between British Provinces and Native States will, if carefully made in conjunction with the study of other maps in this atlas, give rise to another conception, to which it is very desirable that the mind should be led; namely, that different parts of India have different values. Generally speaking, much of the territory coloured as "Native" is far inferior to a very great part of the territory coloured as "British;" and just as the wastes of Central Asia are as nothing compared with India, so the deserts of Rajputana are as nothing compared with one little district in Eastern Bengal. But British possessions differ in value too, and it is extremely important to try and get hold of some general notion of what that difference is, and of the causes which lead to it. To this end it is essential that maps and charts of Indian Physical Geography should be studied, and it may assist those who wish to adopt this course and to begin by condescending to become students of this Statistical Atlas, if they will permit themselves to be addressed for the moment as an audience in a lecture-room.

In the first place then you will be asked to draw out the last map in the series, that one which shows the various Provinces and States of India, and to keep it while reading these pages or examining other maps continuously in view, in order that you may acquire a distinct idea of the name of each part of India which is under your notice at the time. You are next asked to try and form a distinct conception of the high and of the low land in India, undulating broken country, and flat alluvial plain. The raised map,* of which a cast in plaster-of-paris is shown in the Exhibition, gives a perfect idea of the system of mountains and plains in the Indian Continent, but you, who confine your study to this Atlas, must be satisfied with the rough picture presented in the map at the end of this chapter.

The first thing to notice is the Himalayan range. It is not too much to say that India owes its wealth and fertility to the existence of this mountain chain. The value of the Himalayas to India will be discussed later, and all that you are for the moment asked to observe is the position of the mountains and the curious manner in which, standing a lofty, impenetrable wall, they protect India like a rich garden from the bare inhospitable regions beyond; and while you are following with your eye the ranges as they open out from their root in Assam to their wide-spreading branches in Western Tibet and Afghanistan, you may take the opportunity to observe how the little valley of Kashmir lies like a bird's nest between two of the upper branches of the mountain tree.

You may next observe the continuous outpouring of great rivers from the summit of the watershed on the Indian slope, as well as the abstraction from Central Asia of the great rivers which are fed by drainage on the other side. More will be said on this subject presently in connection with the rainfall and its distribution in rivers, but you

* Prepared during the year preceding the Exhibition by Major Charles Strahan, R.E., of the Imperial Survey Department.

may notice at once how the Brahmaputra and Indus rise almost at the same point on the Tibetan side of the Himalayas, and encircling, the one to the right and the other to the left, the mountain shoulders of the continent, fall on this side into the Bay of Bengal and on that into the Arabian Sea. Returning to the Indian slope you may observe how there are poured down in rapid succession, first the great rivers of the Punjab, then the Jumna, next the Ganges, and finally, in stream after stream, the great tributaries of the last-named river of history.

While your attention is thus directed you will learn what must never be forgotten in writing, or in thinking, or in talking about India, *viz.*, the existence of an enormous belt of low-lying alluvial plain, which, with its base resting on the flattened top of the Bay of Bengal, forces itself up between the Himalayan range on the right and the highlands of the continent on the left, till it spreads out like a fan in the desert of the Western Punjab and Rajputana. If some convulsion of the earth were to raise the ocean-level a few hundred feet, all this land would be flooded, the Himalayas would, as perhaps they once were, be cut off from the continent of India by a new Mediterranean; the Bay of Bengal and the Arabian Sea would meet; and the Central Provinces, Bombay, and Madras would be floated as an island not much bigger than Borneo into the midst of the Indian Ocean. Now, the reason why you are asked to acquire a vivid and permanent conception of this geographical fact, is because a great part of the wealth of India is concentrated on this belt of alluvial land to which your attention has been directed. It is here that you may see unbroken continents of wheat, of millets, and of Indian-corn, endless seas of rice and limitless prairies of sugarcane and indigo; it is here that you will find the teeming populations, the network of canals and railways, the seething life of India. Down this ancient sea-bed the tide of Muhammadan invasions ebbed a d flowed, and up this same valley from the east the opposing force of British influence crept hand over hand. The battles of history were fought in the intermediate plains, until step by step the desultory conquerors from the north were beaten back or subdued by the stronger energies of their sea-borne foes from the west, and peace and tranquillity were restored to the millions of raiyat cultivators, who, while battles raged over their heads, ploughed and reaped annual harvests on this wide-spreading belt of fertile soil. Compare the first with the last map in this Atlas, and you will see how there are embedded in this uplifted sea-valley four of the richest provinces of India—first Bengal, then the North-Western Provinces, then Oudh ("The Garden of India,") and finally the Punjab ("The Wheat-field of the Empire.")

You must now cross the fertile sea-bed and rise step by step to the great highland plateau of the Indian peninsula, which, diminutive as it seems when compared with the towering masses of the Himalayas, is still prominent when contrasted with the alluvial plain. The first step is the Aravali range with Mount Abu rising like a pyramid to the left; the second is the elevation known as the Vindhyan range, from which a short stride takes you across the Narbada valley to the Satpura range, and so to the plateau of the British territory of the Central Provinces. From this great central highland flow towards the north, the south, the east, and the west, four great water-systems. The northern flow, represented by the Son river, joins the Ganges system and emerges near Calcutta into the Bay of Bengal; the western streams are the Narbada and Tapti, which fall into the Arabian Sea above Bombay; while the eastern and southern waterflows, centered respectively in the Kistna and Godavari, find their way to the Bay of Bengal. In one place the sources of the four systems meet almost in a point.

You have last to direct your attention to another striking feature of the map in the western wall of mountain which rises abruptly from the shores of the Arabian Sea and skirts the Provinces of Madras and Bombay; this chain is familiarly known as "The *Ghats* of Western India." The waters which pour from the ghats descend on the eastern side in parallel rivers and struggle through the broken undulations of Southern India into the Bay of Bengal, the ghats themselves, as we travel southwards, becoming higher and higher until they culminate in a sort of dumb-bell elevation near Cape Comorin. Under their lea, to the east of the Western Ghats, the table-land of Central India pushes southwards its highland elevations until the little range of the Nilgiris is reached, opposite to which it descends in nearly all its breadth into the low-lying districts of Western Madras. It will be observed that the level stretch of country lying at the foot of the slope is united with the southern end of the Gangetic valley by a narrow fringe of low land, widening occasionally into broad deltas at the mouths of the rivers.

PHYSICAL CONFIGURATION.

PHOTOZINCOGRAPHED AT THE SURVEY OF INDIA OFFICES, CALCUTTA, MARCH 1886.

BRITISH PROVINCES & NATIVE STATES.

CHAPTER II.

GEOLOGY.

If we leave out of count the mountain regions of the Himalaya on the northern frontier and of Afghanistan on the north-west frontier, the geology of India presents singular simplicity of a superficial kind, in that all the rocks are easily separated into a few great groups, as follows:—

6. Alluvial plains.
5. Sedimentary rocks of cretaceous and tertiary ages.
4. The Deccan basalt of cretaceous and lower tertiary age.
3. The Gondwana system, comprising the Indian coal-measures and ranging (inclusively) from the age of the English coal-measures to that of the Portland and Purbeck beds of England.
2. The Vindhyan system, a formation peculiar to India, the age of which cannot be guessed, as it has yielded no fossils, but which is immensely older than the Gondwanas.
1. The archæan or metamorphic rocks, such as gneiss and crystalline schists with the granite often occurring in them, and with some remnants of slaty rocks that have partially escaped the general metamorphism.

Of this list No. 5 might be omitted in a brief sketch of India Proper, *i.e.*, the great peninsula that is so completely separated from the rest of Asia by the broad Indo-Gangetic plains. Although cretaceous and tertiary strata occur in enormous thickness to the west in Sind and to the east in Burma, only small patches of them occur along the coasts of the peninsula which must have been high and dry before those countries were made. The mighty Himalaya mountains, too, have been for the most part formed within this comparatively recent geological time, for marine tertiary deposits are now found in some of the highest parts of the range.

It is only in such a list as this that mud and sand have to be spoken of as 'rock;' for geologists must use some common word for the materials of every formation whether hard or soft. Mud (clay) and sand are pretty much the same all the world over, and in this respect the plains of India do not differ from the fen-country of England or any other alluvial area. In size of course they exceed anything to be found in Europe: one might travel from the mouths of the Ganges to those of the Indus, a distance of nearly 2,000 miles, without coming in sight of a hill or finding a stone. It is the climate that makes the difference, and in this respect there are very striking contrasts in different parts of these same plains: in the rainy regions of the lower Ganges the vegetation is luxuriant beyond anything ever seen in England, whereas in the plains of Upper India, in the Punjab and Rajputana, immense tracts are barren desert (an extreme still further removed from English experience), though the primitive soil is the same in both. The plains have been almost entirely made by the great Himalayan rivers, and the process is still going on, though a good deal modified by human interference. The great rivers mostly flow straight away southwards from the mountains, and the main waterway runs close to the northern edge of the peninsula, from which the plains rise gently northwards, at first with a slope of six inches in the mile, increasing to 10 and up to 50 feet in the mile in the gravel deposits at the base of the hills. There are of course alluvial plains of variable extent along the courses of the peninsular rivers (some of these are shown on the map) and also along the sea margin.

The great basaltic formation, called the Deccan trap, occupying nearly a third of the peninsula towards the north-west, is the remains of prodigious volcanic eruptions that took place about the time when the Chalk and the London-clay were deposited. The volcanic cones of that period have long since been washed away; only traces of centres of eruption have been observed on the western borders of the area, whence the lava must have poured out to the eastward, or else have come up through fissures, now represented by the great dykes of basalt that are common enough all over the area. Thin beds of water deposits are often found between the trap-flows and they mostly contain fossils, but all of fresh-water shells; so the whole must have been then as now well above sea-level. The flows being still in their original flat position the features of this region take the form of plateaus and terraces; though, of course, a plateau will at last wear down into a pillar, of which fact there are many picturesque examples along the scarps of the Western Ghats.

The Gondwana rock-system is mostly a great sandstone formation, such as a mason would call a freestone, with subordinate clays, and very rarely any limestone. As indicated in the list, it represents a great range of geological time. In one of its lowest members coal is very generally present; and the basal group of all, below the coal-measures, displays everywhere the most unmistakeable characters of glacial formation. The Gondwanas lie almost exclusively in the north-eastern quarter of the peninsula, occurring in basins that more or less correspond with the chief river-valleys, but within their own basins they form hills of considerable height. All the fossils found in them, except near the sea margin, are of land or fresh-water species; so for all that time too the peninsula was a land surface.

The Vindhyan rocks are so distinct from the Gondwanas that the two rarely come into contact, and it is abundantly evident that the Vindhyans are of vastly older date, but what their age may be is still unsettled, for they have nowhere yielded any trace of fossils, although the strata are for the most part undisturbed and unaltered, and such as commonly do contain organic remains. Yet in some respects the two are analogous: sandstone is again the prevailing rock, though of much finer grain and much more compacted than the Gondwana sandstone; flaggy shales, often beautifully ripple-marked, are subordinate, and limestone still more so. The Vindhyans too seem to occupy approximately their original local basins in the primitive surface of archæan rocks, and are probably fresh-water deposits.

Of the metamorphic or local archæan rocks there can as yet be very little to say. Here, as in every country, they are the most difficult to unravel, being squeezed and metamorphosed almost beyond recognition of their sedimentary origin. The study of them has in the natural course of work been left to the last, and can hardly be said to have begun. They are made up principally of gneiss, with mica schists and hornblende schists. The scarcity of the ordinary form of granite intrusion in such rocks is remarkable, but much of the gneiss is very massive and granitoid; it will probably prove to be a truly intrusive rock, and therefore a granite in the geological sense of the word.

The tale of mineral products in India is soon told. It is common to see flowery statements in books and newspapers about the boundless

mineral resources of India, but these are all assumption : because there are no mines to speak of in the country, it is believed that as in Australia and other new countries the ores have only to be looked for to be found. It is forgotten that for long ages India has been inhabited by a people highly skilled in the arts, including metallic wares. As a matter of fact, coal is the only mineral they made no use of, although in many places it crops out abundantly at the surface. It is not to be supposed that Englishmen have been so long in India without having a sharp look round for workable deposits, but as yet not one such has been found that the natives had not made use of long ago; even obscure ores of cobalt and manganese have been worked by them. Old mines have been found in the most remote jungles, and some of them were very extensive, superficially, for the natives could never go deep, their only means of unwatering being by carrying the water out in vessels; but it is pretty certain that they hit upon the best deposits that exist. Now many of these old diggings have been examined by experts and pronounced unworkable by modern methods. The difference is quite clear. A gang of half a dozen native miners and smelters can carry their whole plant (a few hammers and tongs and a goat-skin bellows) on their backs, and by the time some of them have prepared a few charges of charcoal, the others with the women and children will have prepared the clay smelting-furnace and collected enough ore. A deposit that would supply such enterprise for many years, would not feed a modern furnace for a day. There are collateral difficulties in the climate and the cost of imported skilled labour; but no doubt such deposits as are fit will be taken up as soon as the conditions admit of it. There is however quite enough evidence for a decided opinion that India is not rich in metallic minerals.

There is one conspicuous exception to this opinion. Few countries in the world can have a more abundant supply of pure iron ores; and in old times iron-smelting was common all over the peninsula and Indian steel was famous. The manufacture is now well nigh extinguished by the cheaper product of wholesale methods. In connection with the coal-fields and with the extension of railways there is no doubt that these methods might now be profitably started in India. Perhaps the peculiar antiquity of the crystalline rocks of the peninsula has some connection with the comparative rarity of metalliferous minerals other than iron, and the habit of such as do occur to be associated with the bedding of the schists, not in true lodes.

If we cross the Bay of Bengal to the much younger crystalline axis of the Malay peninsula, in the Tenasserim and Martaban provinces of Burma and passing northwards close to Mandalay, the mineral prospects are much better. The tin ore of the Malay peninsula has long been famous, and the same rich deposits occur in Tenasserim. Promising deposits of lead and antimony have also been noticed in these regions.

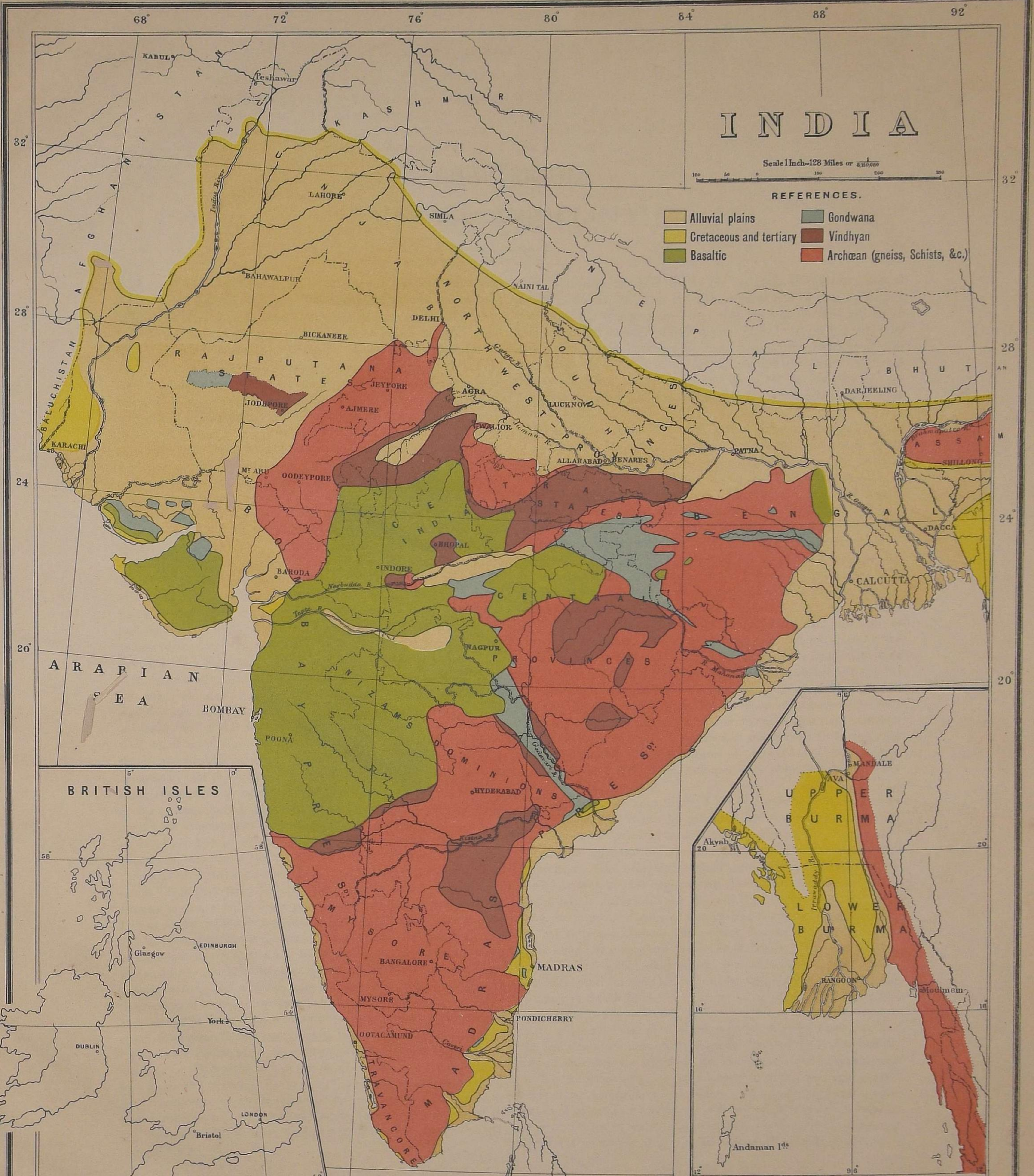
Of non-metalliferous minerals India has some trade in mica, and in garnets, both as gems (carbuncle) and as a substitute for emery. True emery (corundum) is also exported; a very pure and massive corundum occurs at Pipra, in Rewa. The agates and jaspers of Cambay and Broach are well known; they are derived from the detritus of the Deccan trap, in which these quartz minerals occur in drusy cavities. Jade occurs largely in the Northern Himalaya and in Upper Burma, as do rubies and sapphires. The diamonds of India maintain their pre-eminence for purity, but the search for them is less active than it used to be. They occur as pebbles in old gravel-stones of the Vindhyan period and are mined for in this rock, though principally found in alluvial diggings; the true mother-rock of the gem is still unknown. The trade in borax, derived from some mineral springs in Tibet, is still kept up. Nitre is largely collected in the plains, as formed through organic refuse about the sites of human habitation, ancient or modern. Immense deposits of rock-salt are extensively worked in the Salt-range of the Punjab.

In the peninsula, coal is confined to the lower Gondwana deposits. The supply is very great, and much of it is of excellent quality, but the distribution is of course unequal, as the coal-bearing rocks do not occur in southern or western India. In outer India workable coal is only found in much newer rocks, cretaceous and tertiary. These coal-measures are traceable throughout a great portion of the border districts from Malay to Sind, and have often given rise to sanguine expectations of important mineral wealth; but for the most part, and again unfortunately on the western side, the seams have proved too poor to reward mining enterprise, though a small attempt is now being made to work them in the Salt-range on account of the great cost of coal for the railways in the north-western Punjab. In the eastern provinces these newer coal-measures are more mature, and in Upper Assam they attain an immense development, and the coal is remarkably good, being particularly free from ash-forming impurities, which constitute the defect of much of the Gondwana coal.

Whether petroleum is derived from animal or vegetable remains is a point that will probably be settled by compromise; in India its occurrence in more or less proximity to the tertiary coal-measures is perhaps suggestive of a closer connection. 'Rangoon oil' has long been an article of commerce; and recently copious springs of petroleum have been tapped by borings in the Baranga islands and elsewhere on the Arakan coast. There are also abundant oil-springs in or about the coal-measures in Upper Assam. There seems even a chance that petroleum may supplement the lack of coal on the western border: earth-oil in small quantities has for long been extracted from the tertiary rocks in the Punjab and the Afghan-Baluch hills, where trial borings are now being made to test it.

Building stones are of more local interest, as the cost of carriage prohibits their ordinary use unless in the neighbourhood of the quarries. In the plains therefore brick is the universal building material. As a source of lime and for road-metal the only material available in the plains, and the one most commonly used everywhere, consists of calcareous lumps formed in the ground near the surface by the evaporation of water containing lime in solution derived from the decomposition of mineral particles in the soil. They occur locally in England and are called 'race' (root-like): the climatal conditions in India favour their production very extensively. For the cities along the south margin of the plains the Vindhyan sandstones have supplied a perfect stone. The grand palaces and palatial mausoleums of Delhi and Agra are built of it, in conjunction with the marbles of Rajputana. The English have turned it to better account in the railway viaducts over the great rivers. In the Deccan the basalt yields very durable stone, though of sombre hue; while in South India the granitoid gneiss is almost the only material available, but the infinite patience and perseverance of the Hindu workers have turned it to wonderful account in elaborately carved temples of great beauty and massiveness.

GEOLOGY.



Lithographed at the Survey of India Offices, Calcutta, February 1886.

CHAPTER III.

RAINFALL AND CLIMATE.

IT would perhaps be more in accordance with fact and would suggest a truer conception of the variety exhibited by the different provinces of India, were we to speak of the *climates* rather than the climate. Of no single season of the year is the description that holds good for one part of the country equally applicable to all; while, in respect of one of the most important elements of climate, the rainfall, the world itself affords no greater contrast than is to be met with, at one and the same time, within the limits of British India.

India is commonly spoken of as a tropical country, and in part, but only in part, it is so. About one half of its area, corresponding to little more than the peninsula which projects from the Asiatic mainland between the Gulf of Cambay and the Bay of Bengal, lies to the south of the tropic, and for some time during the summer is heated beneath the rays of a sun which is vertically overhead at noon. The Burman and Malay peninsula to the east of the Bay of Bengal, which can only in a qualified sense be spoken of as a part of India, is also included in the torrid zone. On the average of the whole year, these are naturally the warmest regions. Except perhaps for a few weeks about the mid-winter of the northern hemisphere, and then only near its northern limits, there is in this zone no season of the year that can properly be called cold; and were it not for the grateful coolness of a mountain atmosphere afforded by some of its hill tracts the inhabitants of the Indian peninsula would scarcely enjoy a respite from the enervating influence of an enduring, if variable and not very intense, warmth. But it is not here within the torrid zone that the effects of the sun's power are manifested in all their pitiless intensity. South of the tropic, if the noonday sun of the summer season stands somewhat more directly overhead than is ever the case in Northern India, at least the diurnal duration of his power is more limited. He rises later and sets earlier than to the north of the tropic; and the shortening of the day more than compensates for the somewhat greater directness of his rays. Futhermore, as will presently be shown at greater length, the growing intensity of the summer heat brings about its own mitigation, and quenches itself in the summer rains before it has reached its climax.

It is well beyond and to the north of the tropic, in the dry and almost rainless plain of the north-western corner of India traversed by the Indus river, that the summer heat attains the fullest measure of its power. But that heat, if more intense for the time, is less lasting. For four or five months of the summer and autumn, the sands of the Libyan desert and the Sahara, at their hottest, can but rival the burning alluvial plain of the Pat or Cutchee desert that stretches from the banks of the Indus to the foot of the Bolan Pass,—the plain now traversed by the railway which leads up to the common frontier of Baluchistan and Kandahar. But with the later autumn comes relief; and four or five months of a climate comparable with that of a South Italian winter succeed and in some degree compensate for the intensity of the summer heat. Somewhat further north again, indeed, in the most northerly corner of the Punjab plain the contrast between summer and winter is still greater. While the heat of the former season falls but little short of that of the Pat (temperatures of 117° and 118° in the shade having been not infrequently recorded), the winter is positively cold, and on at least two occasions within the last few years snow has been known to fall and accumulate to some thickness on plains less than 2,000 feet above the sea-level.

It is then in Northern India, and especially in the northernmost province, the Punjab, that the annual revolution of the seasons is marked by the strongest contrasts; that the summer heat and winter cold are each manifested in their highest degree. As is invariably the case wherever such contrasts are met, drought is a characteristic of the region. In parts, it is, indeed, almost rainless, and such rain as falls is precarious and uncertain and by no means so definitely concentrated at a particular season of the year as is the case in most other parts of India.

Very different is the climate of Assam, the most easterly province of India, which lies without the tropic. While Sind and the Southern Punjab afford an example of rarely interrupted drought, the valley of Assam and the smaller valley of Sylhet and Cachar, to the east of Bengal, in virtue of their constant humidity, enjoy a wealth of vegetation almost tropical in its varied richness. They have also an alternation of summer and winter of which neither is extreme in its temperature, while the year is not of the unrelieved uniformity which marks the more southern provinces. Evaporation from the broad rivers, swamps, and forests supplies the almost quiescent atmosphere of the valleys with unfailing moisture, which in the winter condenses in fogs on the low grounds, and in the summer furnishes the material of a cloud canopy to screen the land from the ardour of the noonday sun. The rise of temperature, which in most other parts of India follows rapidly on the vernal equinox, is, in Assam, checked and retarded by frequent showers and local storms; and the evergreen figs and bright-flowered trees, the graceful palms, ferns and broad-leaved bananas, the tangled cane-brakes and the gigantic grasses of the swamp-lands, the bizarre and varied forms of the teeming insect life, almost reproduce and rival that richness of organic life which is the especial endowment of the equatorial zone. As realizing the ideal pictures of tropical lands, so frequently set forth by poet and painter, Assam is more tropical than most parts of intertropical India itself.

Thus, then, three very distinct types of climate are presented to us within the limits of India, though united by innumerable intermediate gradations—the damp and uniform, but moderate warmth characteristic of equatorial regions, best represented by the south-west coast of the peninsula, by Travancore and Malabar; the annual alternation of extreme heat with positive cold, the dry atmosphere and rare and scanty rainfall, which characterize the Western Punjab and Upper Sind; and lastly, the perpetual damp, and frequent and heavy rainfall with marked but not extreme vicissitudes of a warm summer and a cool winter, which especially distinguish the valley of Assam. These three illustrative regions occupy, respectively, the three corners, most remote from each other, of the rude trapezoidal figure which represents the boundary of British India.

Were we further to include in this brief survey of Indian climates, on the one hand those parts of the mountain frontier, which, not less than the plains, are comprised within the limits of the British Empire, and, on the other, the islands of the tropical sea, which, equally with the Eastern Peninsula, are dependencies of India, we might greatly heighten the contrasts of our picture. In the former case, on the plateau of our western frontier, we should find, in the early months of the year, phases of wintry weather, spells of snow, sleet, and bitter winds, that would not disgrace the Scottish Highlands at the same

season; and on the other, we might realize to the full, the beautiful tropical imagery of the Laureate, in the

"Summer isles of Eden lying in dark purple spheres of sea."

Such indeed are the Andamans, the Nicobars, and the lovely coral-fringed and forest-clad islets of the Mergui Archipelago.

Now, diverse as are the climatic features briefly sketched in the above description, they are all the result of a system of atmospheric changes, almost unparalleled for their simplicity and regularity. The dominant feature of Indian meteorology is the alternation of the monsoons—the annual reversal of the prevailing wind currents. This alternation is consequent on the fact that, in the early summer, the broad plains and table-lands of India are heated to a far higher temperature than the seas which bathe their shores; whereas, in the winter, the seas retain much of their warmth, while the land radiates away and throws off into stellar space, much more heat than it receives from the oblique rays of the sun during the shorter winter days, and, especially as regards Northern India, speedily cools down to a temperature much below that of the surrounding seas. It will be convenient to look into these states of things a little more closely and to follow them out to their consequences, more especially in regard to the important particulars of the winds and the rainfall. It will then appear how each season in succession affects in diverse modes the different portions of the country: why one province may sometimes be devastated by flood, while another is parched with drought, and why with special adaptation to the peculiarities of its own seasons and resources, each of them has its own agricultural system, its own staples, its own rotation of crops.

The first of the accompanying charts represents the mean distribution of the temperature of India in the three months from March to May which are commonly described as the hot season. This is done in the usual way by lines of equal temperature, the value being noted against each. It will be observed that these lines follow with somewhat striking fidelity the general form of the coasts and mountain frontiers, and that those which indicate the highest temperatures encircle certain tracts in the very heart of the country. This disposition accords with the general statement made above, that in the early summer the land surface is heated to a far higher temperature than the sea, and it further shows that the hottest tracts are those most remote from the sea but not contiguous to the mountains which also to some extent exercise a cooling influence. The first effect of heating the air which rests immediately on the land is to expand it, causing it to lift all the higher overlying atmosphere, much as if it rested on the expanding springs of a spring-mattress. But the atmosphere thus lifted up is but part of the general ocean of air, and being lifted, behaves precisely as would a layer of the ocean if treated in like manner. It flows away on all sides, leaving a somewhat diminished mass of air resting on the plains of India. The next consequence of this action is shown by the barometer, which, as its name implies, measures the weight, or more correctly speaking, the pressure of the air above and immediately around it. The barometer falls, indicating that the air pressure is less than before; and, speaking in general terms, it falls lowest where the heat is greatest, and stands highest on the coast, where, in proximity to the sea, the heat is less excessive. Then follows another and further consequence. Since the air over the sea presses with greater force on its surface than that over the interior of India, and since air being a perfect fluid, presses in all directions, sideways and otherwise, with precisely the same force as downwards, the heavier pressure of the sea air overcomes the lighter pressure of the land air; and while, on the one hand, the higher layers of the atmosphere are flowing outwards from the land towards the sea; on the other hand, its lowest layer resting on the sea sets inwards towards the land, bringing with it the vapour that it has taken up from the sea surface. Such is the explanation of the sea winds which in March, and in some places even in February, set in on the coasts, springing up in the forenoon, blowing more strongly as the heat of the day increases, and declining only after sunset, when the land is rapidly cooling for the night. These winds are not indeed the monsoon, but they arise from similar causes, and in their local and temporary movements, represent the general and more durable movement which is set up at a later period, and which constitutes the *summer*, or as it is more commonly (but less properly) termed, the *south-west* monsoon.

Did these sea winds blow everywhere straight inland, making across the coast line direct for the heart of the country, the vapour which they carry with them would doubtless bring occasional showers of rain to the coasts of all parts of India in about equal measure, and to the country further inland in a minor degree; but such is not the case. They do indeed bring rain, as is shown by the tinting of the chart, but as far as India is concerned, this rain is restricted to the south of the peninsula and to its east coast, to Bengal, Assam, and the slopes of the Himalaya. From about midway up the west coast, throughout the Bombay Presidency and in the adjacent parts of Rajputana, Hyderabad and Berar, rain is virtually withheld throughout these hot months. The reason of this apparent partiality is to be found in a law of great importance and very wide application—a law which, although only fully known and recognized in recent years, holds good of everything that moves on the earth's surface, and therefore, among other things, of the winds. No fact is more familiar than that the earth by its revolution on its axis brings about the alternation of day and night; and it has been shown by Professor Ferrell that another consequence of this rotation is that everything that moves over the surface of the earth in the northern hemisphere presses to the right of its path and tends to deviate in that direction; whereas in the southern hemisphere a similar tendency to the left exists.

Now observe how this tendency manifests itself in the case of the winds pressing inwards from all sides towards the heated Indian land. Instead of coming straight in from the sea, they are all diverted to the right, and thus on the Madras coast instead of being east they are south-east winds, (on that of the Northern Circars south winds,) varying according to the trend of the coast, and always meeting it more or less obliquely. On the coast of Bombay they are chiefly north-west winds, and the same direction, more or less modified according to local accidents of the ground, prevails at this season throughout the Bombay Presidency, and much of Rajputana, Central India, and Hyderabad. But as a glance at the map will show, north-west winds in Western India are not, for the most part, sea winds at all, but come mainly from the Asiatic mainland, and from a land surface remarkable for its aridity. In part these winds descend from the cold table-land and snow-capped ridges of Baluchistan, or sweep over the waterless plain of the Gwadar coast. They are therefore dry, and in their origin cool, winds; but they become hotter and still drier and more parching as they pass over the dry surface of the Indian desert and the heated plains of Sind, Cutch, and Kathiawar. Thus they present themselves throughout the Western Presidency and far into Central India as the well-known hot winds. And, indeed, they are not restricted to Western India. At times they blow right across Northern and Central India up to Bengal and Orissa, and penetrate far down the peninsula, chiefly in the western half, nor are they even restricted to the spring and early summer, though especially characteristic of that season. Even when the summer monsoon is at its height they blow on the Baluchistan table-land, and sometimes dispute the sway of the rain-bearing wind far into the heart of the Indian plains. North-western, and in a subordinate degree Western India are the especial domain of these land winds more or less at all seasons of the year, and to this fact are due the comparative aridity of their surface, and the scanty and precarious character of their rainfall.

Up to May, the sea winds are light, and bring, for the most part, only occasional showers and thunder-storms. But in the latter part of this month stronger winds and heavier rain set in on the Travancore coast and begin to produce stormy weather in the south of the Bay of Bengal; and in the course of three or four weeks they have invaded the whole length of the west coast of India, and the northern and

eastern coasts of the Bay of Bengal. This onset is known as the burst of the monsoon, and it ushers in the rainy season of the greater part of India.

The source of the summer monsoon, or rather of the greater part of the current, appears to be the reservoir of nearly saturated air over the equator, to which the south-east trade winds are at all times pouring in the vapour collected from the surface of the South Indian Ocean. A belt of calms or variable winds some 500 or 600 miles in breadth exists at all times in the immediate neighbourhood of the equator, in the Indian as well as in the Atlantic Ocean. This belt shifts a little to the north or to the south according to the season; but it always exists and is always the seat of uncertain and frequently of showery and squally weather. Up to May the sea winds of the Indian coast appear to be drawn from no more distant region than the Bay of Bengal and the Arabian Sea, the air of which, though damp as compared with that of the land, is far from being so highly charged with moisture as is that of the equatorial sea. It is the tapping in the beginning of June, of this latter reservoir, to feed the indraught of air to the heated Indian plains, that determines the burst of the monsoon.

The monsoon pours into India in very different measure across the west and east coasts, and in consequence, as is shown by the tinting of the second chart, distributes its rain very unequally. On the west coast, it blows directly or almost directly athwart the coast line, and discharges an enormous amount of rain on the face of the Ghat range which runs down the peninsula parallel with the coast, and opposes itself directly to the monsoon wind. On the Bay of Bengal it blows from the south-west, and passing by the Coromandel coast and the Carnatic, to which it furnishes, at the utmost, an occasional shower, it only begins to cross the coast line where to the north of the Godavari river, the direction of this line changes from north to north-east. Between Masulipatam and Orissa, the rainfall is rather greater, but it is not until the monsoon reaches the shores of Bengal that it pours in volume into the country, bringing the abundant rains of Bengal, Assam, and Cachar.

To the north of Bengal the Himalayan chain opposes itself to the course of the current, and diverts a considerable portion of it towards the west and north-west. This sweeps the southern face of the mountains when the rainfall is very heavy, and also carries a certain amount of rain to the plains of the North-Western Provinces and Oudh. In this part of India, therefore, the summer monsoon is most frequently an easterly wind, although it is occasionally displaced by winds from the opposite quarter, involving a suspension of the rainfall, more or less lasting. It is however only a small part of the current that is thus diverted. Another part blows full on the face of the Garo and Khasi hills, which separate the Assam valley from the plains of Sylhet and Cachar, and the forced ascent of the air caused by this obstacle to its passage, gives rise to the enormous rainfall (upwards of 500 inches in the year) which has made Cherapunji famous as the wettest of known places.

Only less heavy is the rainfall of the Arakan coast, which also opposes itself, though somewhat obliquely, to the course of the current. Like the west coast of India this also has a hill range running parallel with it, at no great distance inland; and this range has to be crossed by the wind before it can reach the upper valley of the Irawadi, including Upper Burma, and the inner ranges of hills which run down from the Eastern Himalaya. As in all similar cases, the first range is that which receives the heaviest rain, and the Irawadi valley under its lea (with the exception of the plain of Pegu) has a comparatively small, and somewhat precarious rainfall.

To return now to the western branch of the monsoon, that which enters India from the Arabian Sea. This, after surmounting the Ghats, blows across the peninsula, as a west, and sometimes, in places, as a north-west wind. On the western face of the Ghat range, the rainfall, as already remarked, is excessive; but its moisture would seem to be nearly all expended in the effort of surmounting the range, for beyond it, on the Deccan table-land, the rainfall rapidly diminishes to less than one sixth of the average fall on the coast. Indeed, in the southern half of the peninsula, from June to the middle of October, but little rain falls anywhere to the east of the Western Ghats, either on the Mysore and Bellary table-land, which lies immediately beyond, or on the plains of the Carnatic further eastward. To the north of the Godavari the rainfall of Hyderabad and the eastern provinces of the peninsula is more frequent and abundant; and the dry zone in which rain is most scanty and precarious, is limited to a strip one or two hundred miles in width, running north and south up the Western Deccan, parallel with the Ghats. It is this part of the Deccan, together with the Mysore table-land and the Carnatic, which is most subject to drought, and which in 1877 suffered all the rigours of the memorable famine of that year.

In the north of the peninsula, extending from Bengal nearly across India, is a broad band, the darker tint of which indicates that the rainfall is higher than in the regions either to the north or south of it. It includes all that hill tract known as the Satpura range, the table-land of Chutia Nagpur together with nearly the whole of the Central Provinces, part of the Central India States, Orissa, and Bengal. In this region, not only is the monsoon rainfall more abundant, but it is also more regular and certain than in most parts of India. Much of the country is hilly and forest-clad, although the more valuable forests, especially in those tracts which are under native rule, have been greatly overworked during the last quarter of a century. That the rainfall is favoured by these natural features of the country is highly probable; but the circumstance to which this tract chiefly owes its more regular and abundant watering, is that it lies between the westerly monsoon of the peninsula and the prevailing easterly wind of the Gangetic plain, and is the debatable ground of these two branches of the monsoon. The storms which, during the monsoon, are frequently generated off the coasts of Bengal, constantly traverse this region on their usual westerly course, and their passage is accompanied with rain in considerable quantity, not infrequently flooding the rivers and causing serious damage.

Passing from this belt of high rainfall to the north-west, the quantity rapidly diminishes. Southern and Eastern Rajputana, Gujarat, Cutch and Lower Sind are, indeed, swept during the summer monsoon by a strong west wind, and a branch of this blows pretty steadily, though less strongly, up through Sind and Western Rajputana towards the Punjab, carrying some rain to the latter province. But the strong west wind of Cutch and Guzerat is not itself a rainy wind, and indeed it is only in part fed from the ocean reservoir which furnishes to the monsoon its abundant vapour. In Baluchistan, the prevailing wind throughout the season is from north-west, and there can be little or no doubt that the monsoon which blows from the west across the north of the Arabian Sea is, to some extent, fed with air from the arid shores of Arabia, Persia, and Baluchistan. Nothing marks more strikingly the change in the character of the monsoon current than the rapid falling off in the quantity of the rainfall in the north of the Bombay Presidency. This is not to be explained by any change in the leading features of the country. The Rajpipla hills between the Tapti and Narbada, and the ghats of the Malwa table-land, are physically as capable of draining the air of its moisture as are the Sahyadri Ghats of the Konkan. But the actual precipitation on the face of the former is barely one third of that on the latter, and it would be even less, were it not that a south-west wind sometimes pours in a more abundant supply towards a storm centre having its seat in Gujarat or Western Rajputana. The further we proceed west, however, the more rarely is this the case, until at length in the Pat desert we are practically beyond the limits of the monsoon rains.

The copious watering of the heated land surface which is the immediate effect of the monsoon, at once reduces its temperature; and in not a few parts of the country the rainy season ranks as one of the coolest and pleasantest in the year. The fall of temperature is

almost proportional to the copiousness of the rain; and the only parts of the country which in this respect derive no benefit from the change of season are, on the one hand, the arid and almost rainless provinces of the Punjab, Sind and Western Rajputana, and, on the other, Assam, where rain falls copiously even in the spring months. But it is only in the former of these regions that the heat is intense, that the parched and barren surface of the land continues to glow under an unclouded sun, and that the burning wind of the previous months only becomes more oppressive in virtue of its somewhat greater dampness.

The distribution of the temperature is thus wholly changed on the advent of the rainy season, and the Indus valley in the north and the Carnatic in the south now become the seats of the most oppressive heat.

In September the force of the monsoon begins rapidly to decline; and after about the middle of that month, it ceases to carry rain to the greater part of North-Western India. In Bengal, as a rule, the rains last a month later; but on the west of the Bay the monsoon begins to recurve in October, and now for the first time a more copious rainfall is discharged on the hitherto scantily watered plains of the Carnatic. October too is above all others the month of severe cyclonic storms in the Bay of Bengal. Less frequent, indeed, than those formed during the height of the monsoon off the coasts of Bengal and Orissa, the circumstances favour their prolonged gestation in the central regions of the Bay. Hence they acquire great force and rage over a larger surface; and the storm wave, which so frequently accompanies them when thrown on the shelving foreshores of the northern and eastern coasts, sweeps as an exterminating flood over the densely-peopled alluvial flats of the Ganges and Godavari, multiplying a hundred-fold the destructiveness of the storm.

The rains of the Carnatic last till December, the seat of their chief prevalence moving gradually southwards to Ceylon and the equatorial sea with the declining year. In their rear springs up the gentle, steady north-east wind, which gradually extends over the whole expanse of the Bay and is known as the north-east monsoon. A wind similar but rather more easterly in direction simultaneously takes possession of the Arabian Sea.

Meanwhile, in Northern India, the temperature, after a slight rise on the cessation of the rains, has fallen rapidly in November and December; most rapidly in the Punjab, and more moderately in the peninsula. While rain is still falling heavily in the Southern Presidency, the last two months of the year are in Northern India, as a rule, a season of delightful weather, of cool air and at first of cloudless skies. The average distribution of temperature at this season is shown by the third chart, on which it will be seen that in general the coolness increases with the latitude.

Towards the close of the year, this halcyon state of things is in general interrupted. Cloud begins to form on the mountain peaks, and a thin but rapidly thickening sheet spreads itself in the higher atmosphere, shading the western and northern plains. The pleasant cool breeze from the north or north-west is replaced by warmer and somewhat oppressive light airs from the south and south-west; the skies become thickly overcast, and after a day or two, a fall of rain follows, with more or less copious snow on the hills. In general the rain begins in the Punjab, and extends on the next or following days to the Gangetic valley, sometimes but more rarely reaching to Bengal. Rajputana and Central India also occasionally receive a few light showers; but the Punjab and more especially the North-Western Himalaya are the seat of the most frequent and copious rainfall. This is the winter rainfall of Northern India. It is repeated and becomes more frequent in January, February and March, at least in the Punjab Province, and sometimes in the Northern Punjab it continues into April. Except, however, in the extreme north and west of this province, it is less copious than the rains of the summer monsoon; but it is of high importance in enhancing the yield of the winter crops.

With this brief notice of the Indian winter we complete our round of the seasons, and may bring this sketch to a close. It has been shown that in the greater part of India, the year is practically divided into three well-marked seasons; two of which, *viz.*, the rainy season and the cold season, correspond respectively to the sway of the summer and winter monsoons; while the third, the hot season, marks the transition from the latter to the former. It is, however, something more than a merely transitional state of things; for it is the development of the great heat which characterizes this season in the plains of India that causes and determines the influx of the monsoon rains. The opposite transition, that from the rains to the cold season, is less marked, and hence is not generally recognized as a distinct season. In Northern India it is, indeed, accompanied with a slight temporary rise of temperature, but this quickly disappears, and in Southern India, where the whole course of the year is more uniform than is the case to the north of the tropic, the hot season is virtually prolonged throughout the summer, and the short period of heavy rain that brings the summer to a close, is followed at once by such an apology for coolness as the Carnatic climate can boast.

AVERAGE RAINFALL AND TEMPERATURE DURING THE HOT WEATHER PERIOD - MARCH TO MAY INCLUSIVE.

Lithographed at the Survey of India Offices, Calcutta, February 1886.

AVERAGE RAINFALL AND TEMPERATURE
DURING THE RAINY SEASON OR SOUTH-WEST MONSOON PERIOD-JUNE TO OCTOBER INCLUSIVE.

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CHAPTER IV.

IRRIGATION.

It is the combined forces of the monsoons, mechanically assisted by the mountain ranges, that provide the agricultural resources of India, and raise it to an importance which the barren wastes of the huge continent to which it hangs cannot reach. It is not only in pouring showers and moisture on the crops of each year that the monsoons create the agricultural resources of India; they also wash down, and have for ages washed down in rivers and floods, the fertile soil on which the crops are grown. They also fill vast underground reservoirs with perpetual seas of fresh water. They supply the mountains with their snows and springs. River after river debouches from the grand Himalayan range, to be lifted one after another by the toil and talent of English engineers, and spread over the thirsty plains; and not only so, but, though it seems somewhat unfair, even the rain-waters which descend to the trans-Himalayan regions refuse to enrich Central Asia, and beating like trapped birds against the bars of a cage, press along the outer base of the mountains, till they reach a friendly opening through which they turn with a sharp and eager bend into the plains of India. Thus the Indus and Brahmaputra, the great rivers of the west and the east, break through into the Punjab and Bengal. Lying dormant, too, in the annually renewed reservoirs of mountain-stored water, is an enormously powerful mechanical force which will, some day, be enslaved and controlled by the patient perseverance of our engineers, and will do much to make up for the absence of coal in the northern continent.

The above passage included in the paper read last year before the Society of Arts which is mentioned in the prefatory note to this Atlas forms an appropriate link between the preceding chapter on meteorology and the brief survey of irrigation in India which will be made in this chapter. For it is necessary to understand clearly how moisture is brought to and confined in India before dealing with its distribution and its application to plant-life. Plant-life cannot exist without moisture, and, as agriculture is the science which deals with the utilisation of plants for human needs, agriculture, especially in tropical regions, depends on the provision of moisture by natural or artificial means. If it is asked why the word "moisture" and not "rain" is used, it may be explained that it is simply because moisture is applied to plants in many forms other than that of direct rain; and one of the most interesting studies in Indian agriculture is to examine the different forms in which moisture is made serviceable to plant-life by Nature or by man.

In dealing with this investigation it is desirable at the outset to make one very important division of the "moisture" which is in India available for plant-life. The division is this: There is (I) the moisture brought by the monsoons of the current year, and (II) the moisture left behind by the monsoons of previous years. These supplies of moisture are distributed in the following forms :—

I.—The moisture of the current year—

(*a*) Rain and atmospheric vapour;
(*b*) River-floods and inundations;
(*c*) Shallow tanks and ponds;
(*d*) Retention of moisture in soil.

II.—Moisture of previous years—

(*e*) Rivers fed by snow and mountain springs;
(*f*) Underground reservoirs;
(*g*) Deep lakes or surface reservoirs.

Each of these will be briefly considered in turn.

I. (*a*) Rain and vapour—of which the distribution is clearly indicated in the meteorological maps—are spread in very unequal proportions over India. To some provinces and tracts they are so plentifully supplied by Nature that no artificial means of obtaining moisture for the sustenance of plant-life is there necessary. Such tracts are, speaking generally, Burma, Assam, and Eastern Bengal, a narrow strip running under the Himalayas as far as the boundary between the Punjab and the North-Western Provinces, and the whole of the country on the African side of the Western Ghats. It may assist the reader's imagination to be told that outside India, countries of a similar class are Java, Borneo, Ceylon, the Malay Peninsula, and, to go to Europe, the British Isles themselves. In none of these countries is artificial application of moisture required.

(*b*) River-floods and inundations. Outside India, a typical tract receiving moisture in this form is the delta of the Nile. Inside India such tracts are the deltas of all the large rivers, enormous stretches of country on either side of the rivers in Eastern Bengal and parts of Assam, here and there a tract of country at the foot of the Himalayas, strips of land along the banks of the large rivers which intersect the Gangetic valley, and, everywhere, but especially in the lower part of the Gangetic valley, wide-spreading swamps from which the water of the rains cannot readily escape until removed by evaporation. In the north-west of India the distribution of the annual flooding is much assisted by inundation canals,—that is to say, by canals which carry off the high-level water or "spill" when the river is in full flood. Canals of this kind were much used by the natives of India before British occupation.

(*c*) Tanks and ponds. By these terms are meant such shallow hollows and depressions as are only of sufficient depth to hold the supply of one year, and which dry up altogether in the hot season. They are most numerous in clay soils and prevail over the whole of the Gangetic valley as far as Oudh. They are also numerous in some parts of Madras and Bombay.

(*d*) Retention of moisture. An example of a soil which retains moisture is to be found in soil in the "black cotton soil" of Central India. Black soil is derived from trap rock, and possesses the peculiar property of resisting evaporation. At the commencement of the hot season large cracks or fissures begin to form, which, as the dryness of the atmosphere increases, become wider and wider until they gape to such an extent as to make it unsafe for a rider to take his horse across country. In the meantime each of the blocks of earth which is surrounded by the widening fissures is contracting more and more tightly, and grasps in a closer grip the moisture lying within its spongy cells. The fact that the rich black soil of the trap-rock country requires no irrigation accounts for the small figure shown against the Central Provinces in the Irrigation Table opposite page 16. In the same class with the black cotton soil

may be placed the enormous flats which lie alongside the river-beds of large streams in the sandy plains of the Punjab, and which, though not inundated, hold a supply of moisture sufficient without irrigation for plant-life.

II. (*e*) The first method of storage of the moisture of previous years is provided by Nature in the snows of the Himalayas and in the springs of all mountain elevations in India. This supply is distributed by canals taken from rivers that are fed by melting snows and mountain springs. An examination of the Irrigation Table will indicate roughly the tracts of country which are thus supplied with water, the most prominent being the western end of the sub-Himalayan chain, and the west coast of Madras. In the Punjab system of irrigation, whole rivers of great size are lifted bodily into canals constructed just above the foot of the Himalayas and are spread over the plains in a network of distributing channels. The Ganges, after being lifted into its canal-bed, is carried first under one river, then through a second, and, finally, in a long aqueduct over a third. The width of the canal at this point is 160 feet. The total length of the Ganges Canal, exclusive of distributing channels, is one thousand miles. These figures will convey some idea to the imagination of the magnitude of an Indian canal. The various canal systems under the supervision of the Government are shown in the Table. Their total length, including distributaries, is over twenty-eight thousand miles, or twenty times the length of the River Ganges, and the area they irrigate is equal to the total area of Belgium.

(*f*) Underground reservoirs. These constitute the most important form in which the rain of previous monsoons is stored and applied for agricultural purposes. The rain, which falls over the whole of the shaded surface of the meteorological maps, soaks into the soil and forms underground seas and reservoirs, from which, if the water surface is not too far below the surface of the land, the water is lifted up or baled out by the cultivating population through cylindrical holes or wells, for the irrigation of their crops. The most important of the fresh-water reservoirs thus formed underground is that which underlies the whole of the brown or alluvial belt (see Geological Map) from Peshawar to Calcutta, and which is large enough to deserve the name of an underground fresh-water sea. The underground sea of this great alluvial valley is more largely used in the central section than at either extremity, because towards the western or Punjab end the water lies at too great a distance from the surface of the soil to admit of its being lifted without great labour and expense, while towards the eastern or Bengal end rain and moisture are so plentiful as to make irrigation unnecessary. In the central part of the alluvial valley the atmosphere is sufficiently dry to demand irrigation, while the surface of the subsoil sea is so near as to be easily reached. Hence, between Delhi and Benares, the upper stratum of the alluvial plain is riddled like a sieve with water-holes or wells from 10 to 50 feet in depth, and the result is that the Irrigation Table shows the "well"-watered area of the North-Western Provinces to be far in excess of that of any other province.

Passing to the other parts of India, we find that Madras is the only province in which wells are at all numerous. They occur chiefly in the low-lying tract which in the first map of the Atlas is to be observed in the south-eastern part of the Presidency. Elsewhere subsoil water is generally too far from the surface of the land to admit of wells being made except in those places where a local reservoir of underground water is formed by a hollow depression in hard rock. Such underground reservoirs or lakes often occur in connection with the reservoirs formed naturally or artificially on the surface of the country. The underground reservoir or lake is, as it were, the subsoil shadow or fringe of the surface lake, and wells are consequently not seldom found within a mile or two of an open lake in a country where they are elsewhere wanting.

(*g*) Deep lakes or surface reservoirs. These lakes or reservoirs constitute the final class of the list. The most striking and prominent of them are those which are formed in the large valleys and ravines of the hard archæan rocks. In many places they have been formed by Nature, but in very many more have been constructed by the Rajput and Muhammadan nobles of former ages, or recently by English engineers, through the agency of dykes or dams of masonry and earth built across the mouths of valleys. One of the most striking features of the whole country between the Aravali range and the north edge of the black soil table-land is the succession of magnificent lake reservoirs which have been thus constructed, and on the banks of which towns and palaces are often built. They appear again in the country lying to the south of the plateau of Central India. In the Madras Presidency they with their attendant fringe of wells constitute the main source of irrigation, and are known under the somewhat misleading name of "Tanks."

One interesting fact which is brought out by the above analysis is the connection between the geological formation of India and the form in which moisture is applied to plant-life. A glance at the Geological Map will show that there are three broad divisions of prevalent colours, the brown, the green, and the red. The brown tract from Peshawar to Calcutta is a level field, lying, as already explained, over a fresh-water sea. The soil of this field gradually changes from sand in Rajputana and the Punjab to loam in the North-Western Provinces, and to clay and mud in Bengal. It is canal-watered in the west, honey-combed with wells in the centre, and washed in the east by rivers and Nile-like floods of fertilising mud and water. The green tract is neither more nor less than a huge sponge. It contains so large a proportion of rich, black, water-holding soil that it seeks for no other form of moisture supply. The red tract is hard rock covered with fissures, corrugations, and hollows in which surface-waters can be collected with or without the aid of artificial dams.

The Government of the country has still a great duty before it in assisting the cultivating population to make extended use of the various forms of water and moisture supply. Where the water lies at their doors or under their feet the people are extremely clever at all kinds of contrivances for constructing wells, and baling out or lifting up water. But while, on the one hand, they want capital in the form either of loans or of suspension of revenue, they require, on the other, engineering assistance where large works, such as the conversion of rivers into canals or of valleys into lakes, are concerned. It may be safely said that the British Government is doing in these directions all that the financial position of its Indian exchequer permits.

BLOCKS SHOWING CULTIVATED AND IRRIGATED AREAS.

PROVINCES	AREA CULTIVATED	AREA IRRIGATED				
		Total	From Snow fed Canals	From other Canals	From Wells	From other Sources
INDIA	199,500,000	30,000,000	2,800,000	5,100,000	12,900,000	9,000,000
BENGAL	54,500,000	1,000,000	20,000	380,000	600,000	
N. W. P. AND OUDH	36,000,000	12,100,000	2,000,000	100,000	6,000,000	4,000,000
MADRAS	32,000,000	7,300,000		2,000,000	2,300,000	3,000,000
BOMBAY AND SINDH	26,000,000	2,750,000		1,800,000	450,000	500,000
PUNJAB	22,500,000	6,000,000	800,000	800,000	3,500,000	900,000
CENTRAL PROVINCES	13,000,000	400,000		700	73,000	326,300
BERAR	6,500,000	50,000		200	46,800	3,000
MYSORE	5,000,000	800,000		25,000	25,000	750,000
BRITISH BURMA	4,000,000	5,500		2,200	300	3,000

PHOTOZINCOGRAPHED AT THE SURVEY OF INDIA OFFICES, CALCUTTA, MARCH 1880.

NOTE.—Each small square represents 1,000,000 acres.

CHAPTER V.

DISTRIBUTION OF CROPS, FOOD-SUPPLY, AND FAMINES.

THE object of this chapter is to present a very broad and general view of the agricultural scheme of the whole Empire rather than a detailed description of the various processes and agricultural operations in each separate Province and State. For the conditions of each are so different and the habits and customs of the diverse races and tribes so various that anything like a complete survey of the agricultural implements and methods in each part of the country would be both confusing and wearisome.

The subjects which will be dealt with in this chapter are—

(1) The distribution of crops.
(2) The food-supply.
(3) Protection from drought and famine.

Distribution of Crops.—The first fact to be grasped is that there is no agricultural plant in the world that cannot be grown in India, from the rice and sugarcane of the tropics to the wheat and barley of the temperate zone. It will of course be easy to understand that tropical vegetation would find a natural home in many parts of the country; but it is to some people surprising to learn that the crops of Northern Europe can be so successfully cultivated in India. The explanation is this: Draw a line from Bombay or a little above it round the southern edge of the Central Provinces plateau to Patna. This divides India roughly into two halves, the north-western and the southern and eastern. Now, in the north-western half the climate of the winter months is just as cold as, and in many parts much colder than, the summer of Northern Europe. Provided, therefore, that the crop can be sown, grown, and harvested between the decline of the autumn heat and the commencement of the summer heat, all the agricultural plants of a cold climate can be successfully cultivated in the Indian winter. Nature has assisted to bring about this result by the development of varieties of wheats, barleys, and other well-known cereals which ripen more quickly than those of colder climates, and so escape the fiercer heat which would scorch the crop as it comes to maturity. In evidence of this proposition it may be stated as a proved fact that wheat grown from English seed fails in India, because it does not ripen quickly enough to allow of its being harvested before the hot dry winds begin to blow.

Understanding now that the north-western half of India enjoys a Northern Europe climate for the best part of the winter, it must be remembered that for the rest of the year the same north-western half has a hot tropical climate, while the southern and eastern half of India has a hot tropical climate all the year round. By a simple arithmetical process it will be easy to calculate, therefore, that, roughly speaking, one quarter of the crops of India are Northern Europe crops and three fourths tropical crops. A grasp of this simple idea will go a long way to explain the variety and relative areas of products in the country.

Before proceeding to the brief sketch which it is proposed to give of the distribution of leading crops throughout the Empire, it is desirable to draw attention to one or two general facts which are common to all India, and which may be disposed of before any contrast is made between the products of different parts of the country. The first is the prominent part taken by millets, lentils, and oilseeds in the agricultural system. These crops all require a moderate amount of rain and heat, and therefore can be and are grown throughout the country. They cannot stand being swamped, and therefore choose the drier seasons in very wet country; and they cannot stand cold, and therefore choose the hotter seasons in the very cold country. But there is no part of India except regions of perpetual swamp where they cannot grow. Hence these crops, which hardly enter at all into the agricultural system of Northern Europe, do enter very enormously into that of India. If it were asked, for instance, what was the staple food in India, there is no doubt that "millets and lentils" would be a much truer answer than "rice." Lentils are almost universally grown in the same fields as other crops, such as millets, cotton, &c., so that it is difficult to measure the extent of their growth. Oilseeds, originally grown for purposes of lighting as well as for mixing with the food of man and beast, have, as shown in the chapter on Trade, now become one of the principal articles of export to Europe. The plants chiefly cultivated for this purpose are linseed, various kinds of mustards and rapes, castor and *til* or sesame. The first three are grown in the winter on the cold side of the dividing line above indicated, while the last two are grown chiefly in damper localities on the warmer side of the line. But there is now no part of India except the rice swamps in which some kind of oilseed is not extensively cultivated. Like lentils they are largely grown in the same fields as other crops. Thus rows of castor-oil shrubs form long sheets in the midst of standing crops of cotton and *dhál*, while the yellow blossoms of the mustards and rapes or the delicate blue petals of the linseed brighten the wheat and barley fields of Northern India, just as the wild flowers of England add a pleasing touch of colour to the monotonous acres of cereals in the Eastern Counties.

This circumstance leads us to note another difference between the cultivation of India and England. The fields of India, especially in the winter months, are kept scrupulously clean. For, owing to the cheapness of labour and the smallness of the farms (generally five or six acres in extent), weeding is more easily accomplished than in England; and, not only so, but weeds are actually replaced by lentils and oilseeds. If then, as often happens, the crop of millets or of cereals suffers under an adverse season, the vegetation that springs up in its place is not a useless tangle of weeds but an absolute source of profit. The practice of thus mixing various plants, sometimes as many as six or eight, in the same field, makes it extremely difficult to gauge the area and outturn of each of the staple crops of the country, and the estimates which have been arrived at in the table of areas at the end of this chapter have been framed by the aid of conventional fractions which allot definite portions of an acre to each of the principal plants cultivated within it.

The crops which have been described above—*viz.*, the millets, the lentils, and the oilseeds—are what may be termed the "universal crops" or those which are common to all India. Eliminating them we may proceed to a rough survey of the distribution of other products. Taking first the valley between Peshawar and Calcutta, we find two well-marked divisions, one at either extremity: at the Punjab end, wheat and other cereals of Europe; at the Bengal end, rice and Indian-corn; between, from Delhi to Patna, a mixture of the two, with a

tendency for the Punjab vegetation to predominate. Sugar centres in the North-Western Provinces, where the area under cane is double that of the provinces on either side; and it may be mentioned here that a steady export of manufactured sugar flows from the Gangetic valley towards Central India and Rajputana throughout the year. In Bengal a good deal of the sugar is derived from the date palm. Indigo centres in Bengal, but the seed is grown in the North-Western Provinces and annually exported to Bengal, where the dampness is unfavourable for ripening seed, although favourable to a dye-producing leaf. Jute is confined to a few districts in Eastern Bengal, and is almost unknown in any other province in India. The only root field-crops of the valley are turnips in one or two districts on the western edge of the Punjab, radishes and small carrots, and, from Delhi to Patna, potatoes. Vegetables, however, of all kinds are raised in market gardens in the neighbourhood of every large town. Opium flourishes between Lucknow and Patna, and is one of the main supports of a crowded population in that section of the valley. Inferior cotton is grown in the Punjab and the North-Western Provinces, and a few fibre-growing plants are mixed with other cultivation. Passing now to Middle India, and including in this term the States of Central India, North Bombay and the Central Provinces, we come to the red wheat field of India, which does not, like that of the Punjab, depend on winter rain and canals, but on autumn rains and a spongy soil. The special feature of this section, however, is cotton, which owes its predominance to the geological character of the land. The "black cotton soil" of Central India is a household word. Extensive rice-fields are found in the low-lying lands in the north-west, and opium in the uplands of Malwa, where it is largely cultivated in the Central India States.

The south and west of the Middle India plateau are full of broken ground and wild jungle, from Chutia Nagpur in the east through Orissa and along the north of the Hyderabad State almost to the town of Bombay. Below this line wheat disappears, and the tropical vegetation of the peninsula becomes more pronounced. Rice and cocoanuts are grown on the low lands, and on the high lands coffee, cinchona, and spices. Cotton gradually diminishes as the black soil gives place to the harder rocks. One product—tobacco—has been omitted in the above survey. The fact is that no province is *par excellence* the tobacco-growing province of India, since as a rule each district grows as a market garden crop what it requires for its own consumption, but if it is necessary to give tobacco a special home, it must be in the districts lying north of Calcutta. The best leaf is that grown in the alluvial islets and deltas of the large rivers of the south, but the quantity is not so great as in Bengal, which supplies the tobacco-loving Burmese with the leaf required for their cigars. Improvement in the system of curing is now beginning to bring Indian into competition with American tobaccos in European markets.

The products of the Himalayas, so far as they are under British occupation, are potatoes, fruit, tea, and towards the east cinchona, in addition to wheat, barley, and millets grown by the people for their own food. European fruits such as apples and pears are towards the west beginning to be established—the most favourable climate for them being found in Kashmir. The last tract which may be noticed is a narrow strip of land under the Himalayan range called the Tarai, which may be described as the sub-Himalayan fens. The staple crops produced there are rice, oilseeds, and sugarcane.

Two other geographical facts connected with the agricultural system of the country may be properly alluded to in this place. One is that the great cattle-breeding grounds of the country are found in the area of almost the minimum rainfall on the edge of the monsoon-watered areas. There appear to be two reasons to account for this circumstance—one that the greater part of the land, though possessing fertile soil, and producing under the influence of very slight rain magnificent crops of grass, has not sufficient means of irrigation to grow any extensive area of good crops for the sustenance of man. The other is that the soil and climate are specially favourable to the health of cattle. There is sufficient salt in the soil and sufficient dryness in the air to prevent the "germ-diseases" so prevalent in the moister parts of India from which the salt is drained away. The consequence is that the magnificent prairies of grass in the belt between Cutch and Kashmir are covered by millions of cattle. There are also numerous herds of fine cattle throughout the hilly plateaus from Central India to Mysore, but they bear no comparison in number to those of the plains of Rajputana. From these breeding grounds, the light blues of the rainfall maps, cattle filter to the darker blue tracts, until the deepest colours which are too unhealthy for any kine but buffaloes are reached. Eastern Bengal and Burma are cultivated with the agency of buffaloes, which find a congenial home in their muddy swamps.

The second geographical fact to which attention may be drawn is that just within the belt of cattle-prairies to which allusion has now been made, and marked by a deeper colour on the rainfall map, is a belt of land on the surface of which so much salt, or rather efflorescence of saline substances, is deposited that cultivation is in many parts impossible. This belt runs through the lower part of the Punjab above Delhi and across the North-Western Provinces through the most fertile districts to Benares. There are two reasons why this belt is subject to the deposit of saline efflorescence. The one is that a considerable amount of moisture in the soil and a considerable amount of dryness in the air are required for the evaporating process necessary to bring saline efflorescence in injurious quantity to the surface of the land. These two conditions are only prevalent in the belt just described. In the Upper Punjab and Rajputana the soil is too dry, and in Bengal and elsewhere the air is too moist for excessive evaporation. The other reason is that there is in this belt a layer of loam soil over the sandy strata upon which the saline efflorescence can be deposited, whereas in the sand of the western regions it is washed away, and in the clay of the eastern regions it cannot easily rise. It is a curious fact that the very best harvests and finest crops of the Gangetic valley are reaped alongside of absolutely barren land incapable of growing a blade of grass—a fact which is accounted for by the circumstance that the presence of saline ingredients when not in excess is positively useful to plant-life. Accident of surface undulations or subsoil irregularities has caused drainage water to carry and deposit the excess salts into shallow depressions whether above or under ground, and the consequence is a chequered surface of snow white intermingled with rich greens throughout a belt of several thousand square miles. The extent of land thus kept out of the area of production is enormous,—very many hundreds of square miles,—and the problem of bringing it under cultivation is one which deserves continuous investigation.

The Food-supply.—The general distribution of crops throughout India having now been indicated, it will be interesting to examine briefly one of the most important agricultural problems of the country,—*viz.*, the requirements of the population for food, and the character and amount of exports of grain and other produce. The first question was so thoroughly studied and worked out by the Famine Commissioners that it will be useful to quote the summary entitled "The Staple Food of the People" contained in their final report :—

"The food of the people," they wrote, "is essentially vegetable, and consists for the most part, as might be expected, of the food-crops ordinarily raised in the country they inhabit; the coarser grains being consumed by the poorer classes of population, and the finer and dearer kinds by the richer classes. In the Punjab, the North-Western Provinces and Oudh, in Behar and the northern part of the Central Provinces, and in Gujarat, the poorer classes live on the millets grown in the rains and on barley and gram; the richer classes eat principally wheat and rice. In Bengal Proper and Orissa, and the eastern portion of Central India, rice is the principal food, the coarse early rice being mainly taken by the poor, the finer late rice by the rich. In the south or

Mahratta-speaking part of the Central Provinces, in Berar, in the Bombay Deccan, and the northern part of Madras, the two large millets, jowar and bajra, form the principal food, the Brahmins generally living on imported rice and wheat. In Mysore the ordinary food is the small millet ragi. In the southern part of Madras, and the western districts of Bombay, rice is chiefly consumed, though there is also a good deal of millet grown and eaten. All classes mix pulses with their food, the nitrogenous matter which is found in the pulses supplying an ingredient of which little exists in the cereal grains, and which is necessary for the proper nutrition of persons who rarely eat meat.

"The degree in which the inhabitants of the different provinces depend on the three main classes of food-grain—wheat or barley, millets, and rice—may be shown approximately by the areas on which those crops are grown:—

PROVINCE.	PERCENTAGE OF FOOD-GROWING AREA UNDER			Total Population.	Population eating Rice.
	Wheat or Barley.	Millets.	Rice.		
				Millions.	Millions.
Punjab	54	41	5	20	1
North-Western Provinces	57	34	9	42	4
Bengal and Assam	Not	known	—	66	46
Central Provinces	27	39	34	8	3
Berar	17	82	1	2	—
Bombay	7	83	10	17	2
Madras	—	67	33	31	10
Mysore	—	84	16	5	1
TOTAL	—	—	—	191	67

"Maize or Indian-corn (*Zea mays*) does not form so large an element in the food of the people as might have been expected from the fact that it is grown to some extent in almost every part of the country, and can be grown everywhere, and, in Southern India at least, at any season in the year. In practice, however, it is commonly only grown in small garden plots, and much of it is consumed by the growers before it ripens, very little coming into the market. It is rarely ground or exposed for sale in the form of meal. Other vegetables, such as spinach, pumpkins, carrots, and potatoes, are also cultivated, for the most part for home consumption; only near large towns are they grown for the market. The use of them as food is universal, except in the case of those families who do not possess land, and who are not rich enough to buy them. Such persons often supply their wants by wild herbs from the fields and waste lands which are found by experience to be wholesome and palatable. The leaves of the mustard and rape and the gram (*Cicer*) plants are also very frequently picked from the fields and cooked for food like spinach. The fruit of the mhowa tree (*Bassia latifolia*) is an important element in the food of the people wherever that tree is abundant, which it is in most parts of Central India and the Central Provinces, and many of the wild tribes in these tracts subsist almost entirely on this and on similar forest products. The mango, plantain, and cocoanut also enter largely into the food of the country.

"Meat is comparatively little eaten by any classes in India. Muhammadans indeed, for the most part, make it a regular article of their diet, but in small quantities, to supplement the main vegetable elements of their food. The meat they eat is generally that of sheep and goats, less often beef or fowl. The lower classes of Hindus have no scruples in eating meat other than the flesh of horned cattle, and their abstinence is largely due to their inability to buy so expensive a luxury. Rajputs, especially in Central India, where the chase is often the chief occupation of their lives, and the wild tribes all over India who live in the forests, eat what they can kill, including even the flesh of the wild pig; but many tribes of pure Hindu blood refuse to eat the flesh of deer and swine when thus killed. Fowls and eggs, in some parts of the country, are held in abhorrence by all but the very lowest classes, who feed also on such creatures as rats and mice, and on the flesh of dead bullocks; and to these classes a famine, at least in its initial stage, often brings an unwonted supply of food, by reason of the mortality amongst the cattle. Both sea and fresh-water fish are favourite articles of diet whenever they can be caught; and dry salt-fish is largely consumed all along the coast, and most of all in the Madras Presidency. But the great mass of the inhabitants of India taste no animal food from one end of the year to another, except milk, curds, and ghi or clarified butter. No form of cheese is known."

The question which now has to be considered is the relation between the exports of agricultural produce and the food-supply of the country. There is no subject connected with the present position of its agriculture which is of greater interest, seeing that the three great changes introduced since the British occupation of India which have most affected the agricultural system are the extension of canal and well irrigation, the construction of railways, and the establishment of cheap communication by sea with the rest of the world. The first measure has simply added to the productive power of the land. The value of the crops raised by canals is shown in the second of the tables opposite page 16 to be approximately £17,780,000 sterling, and though a material portion of this income might even without canals be raised in ordinary years, yet the greater part of it is positively due to the canals alone. It is not the case that canal water injures agricultural land. The excessive use of it exhausts the soil for the time being, and owing to its low price and too easy purchase it often does produce this effect for some years after its introduction; but as time goes on, men and cattle increase in the neighbourhood of the new canal, and with their increase the manure-supply rises until the watered area becomes like a garden. The increase of the area irrigated from wells is indirectly due to the action of Government in the advance of loans for the construction of them and in the remission of revenue for a term of years on land irrigated by new wells.

The main effect of the construction of a network of railways has been the equalisation of prices. The value of the produce has been gradually raised in tracts from which hitherto the surplus crops could not be removed except at an extravagant cost, and has been lowered in tracts which formerly had a monopoly of the exports. The average price of surplus produce landed at a seaport is therefore gradually reduced. The increased efficiency of sea transport has had the further effect of lowering the price at the ports in foreign countries. To these three factors—*i.e.*, to the increase of irrigation and the cheapening of transport by land and by sea—must be added the gradual fall in the value of silver, which now acts as a protective duty of something like 20 to 25 per cent. The chief result of these combined forces has been to increase generally the profits of producers, to open a market to those tracts which could not hitherto dispose of their produce at any price, however low, and to bring the whole country in years of drought within reach of food. It seems a mistake to suppose that the available food-supply is diminished by the impulse given to the export of wheat or any other product. In the four prominent wheat-producing tracts recent enquiry has proved that while the food-supply has not diminished with the increase of exports, the food-purchasing power of the cultivating population has considerably increased; and lastly, that if the demand for wheat were to decline, its place would be taken by cotton, oilseeds, and other exportable products. Thus it has been shown that in Oudh the ordinary amount of cheaper grains required by the people has still been kept in the province, but that the value of the grain exports has been nearly doubled by the development of the wheat trade. In the North-Western Provinces it is reported that nearly a million acres have been brought under cultivation within the last five years, but that the area under other food-crops has not only not diminished but has actually increased. The reports from the Central Provinces show a similar state of things. The Punjab, in which province alone wheat is the staple food of the agricultural population, owes its chief prosperity to the export of its surplus wheat. On the other hand, an enormous quantity of cheap food grains has been made available to the cultivators of the wheat-producing provinces by connecting them by rail with those out-of-the-way tracts to which they had formerly no access, and in which surplus food-grains were so useless to the population that they could actually find no purchasers and were quoted accordingly at nominal prices. A diagram showing the fluctuations in the price of wheat in the Cawnpore markets during the years 1860–1884 is appended to this chapter.

The extent to which the material wealth of the cultivating population has been increased in recent years by the expansion of exports

is indicated by the following table, showing the statistics of the leading commercial products in tons :—

	WHEAT.	OILSEEDS.	RICE.
Average of the Exports of 8 years preceding April 1875	29,700	233,100	831,000
Average of the Exports of 10 years following March 1875	479,500	577,700	1,193,000

The general conclusion from the evidence before the Government of India is that the recent increase of population has been accompanied by an increase in produce which has not only supplied the extra food required for the sustenance of the new population, but has also added to the material wealth of the whole body of the inhabitants of the Indian Empire by providing a large surplus for sale to other countries. The real cause of the distress and poverty of the cultivators in many parts of India is to be found, not in the export of their food, not in the oppression of taxes and rents, not in the administration of the country, but in the uncertainty of the one great source of agricultural wealth—the rainfall of the year. An attempt will be made to illustrate this assertion in the succeeding paragraphs.

Droughts and Famines.—We have here to deal with a subject which is not properly understood by those who have only a cursory acquaintance with India, or only an intimate knowledge of some parts of it. The fact which it is most necessary to grasp is that occasional famine is only the pronounced expression of continuous scarcity; or in other words, that complete failures of crops in certain parts of India which are so severe as to attract public notice are but as the deep and long-cast shadows of depressions in the agricultural outturn which occur almost every year; that the problem, in fact, of saving a portion of the population from misery and semi-starvation is, over vast areas of India, an annually recurring one. "The uncertain character of the rain," it was written last year, "is so excessive that the agricultural outturn, so far as it depends on the rainfall *of the year*, oscillates violently." English farmers did not, perhaps, know at one time what a violent oscillation of produce meant, and always expected to get twenty-eight to thirty-two bushels of corn an acre, whatever the season might be. They have had more experience lately, but they would be taken aback, perhaps, if they were asked to cultivate farms in which it was a mere chance whether the outturn would be nothing, or twenty bushels an acre. How to overcome this oscillation, or to mitigate its effects, is the great problem which has to be solved, and it is being vigorously attacked, and to some extent solved, in India.

Unfortunately it is in the areas of uncertain rainfall, which are the battle-fields where a continual fight between death-dealing desiccation and life-bestowing moisture is carried on, that the largest populations are often found, and it is only by bringing to their aid every means of assistance (not irrigation alone) to enable them to overcome or mitigate the effects of desiccation, that the agricultural outturn of the Empire can be most materially increased.

Before indicating those means it is necessary to describe the area of uncertain rainfall. We may exclude at once two exceedingly well-marked areas,—*viz.*, the area of constant rainfall, and the area of constant drought. It may at first sight appear singular that the area of constant drought should be as secure against famine as the area of constant rainfall. But a little consideration will show that without the aid of a perfect supply of irrigation or moisture it would be impossible to cultivate that area which never, under any circumstances, gets sufficient rain for the sustenance of plant-life. Hence, so far as cultivated crops are concerned, Sind, Western Rajputana, and the Western Punjab never suffer from failure of cultivated crops, seeing that no single acre is cultivated without a supply of water from a masonry well, a canal, or river-bed moisture. What they do suffer from sometimes is failure of grass for cattle; but as for the moment we are only dealing with field crops, the argument need not be interrupted by this circumstance. Turning now to tracts rendered secure by a constant moisture supply, a glance at the rainfall maps in Chapter III will quickly show that these are, roughly speaking, Eastern Bengal, Assam, the Central Provinces, and finally the long narrow strip on the Arabian Sea side of the Western Ghats. Having thus eliminated the secure tracts, it will be easy to pick out the tracts of uncertain rainfall, or, as they may be called, the insecure tracts, which in nine years out of ten get enough rain to tempt a large population to grow crops without irrigation, and in the tenth year or thereabouts are afflicted with a complete drought. Between the extreme misery and starvation under complete drought, in the areas of maximum insecurity, and the happy condition of absolute certainty of produce in the tracts of constant moisture or constant irrigation, there occur all degrees of scarcity and all grades of suffering. The map of average rainfall from June to October in Chapter III is based on the statistics of 30 years. The area of uncertain rainfall is very fairly marked by following with the eye or the finger the shaded area of "10 to 30 inches of rain," first from Lahore to Allahabad, then across to Ajmir round by Udaipur to Baroda, and finally through the Bombay Deccan to Mysore.

The districts which lie along the edge of the dark blue in the map, and those which are situated under the lee of the Western Ghats, and thereby excluded from the influence of any monsoon of unusual weakness, are in the most perilous position.

The next point to be grasped is that when the south-west monsoon is deficient in force and brings a less amount of vapour over the country than usual, the areas just described are the first to suffer. Sometimes it is one tract, sometimes another, but it seldom happens that in any one year the monsoon winds blow with sufficient force over the whole continent to supply every part of it with the average rainfall. When there is a universal shrinkage, as it may be called, of the whole monsoon, the failure of agriculture is most marked throughout the indicated belt of which the average rainfall is from 10 to 30 inches.

The effect of the oscillation of the rainfall on the agricultural system of India was thus described in the paper read last year before the Society of Arts :—

"Owing partly to historical causes, and partly to the fearful struggle that has to be carried on with nature in many parts of India, the Indian cultivators have, as a rule, developed into the most patient, hard-working, and, in many cases, skilful agriculturists that can be found on the face of the earth. Inured to privation, accustomed to maintaining life on short meals, and with scanty clothing, they give their labour for the smallest return it is possible to conceive. The consequence is that, broadly speaking, the agriculture of the country is carried on by a vast human machine—a machine of flesh and blood—which is cheaper in its working than it is possible for any machine of steam and iron to be. A Public Works official who went lately from India to America to look at the agricultural machines in that country was struck by nothing more than the way in which machines diminished in size and frequency as he passed from a region of high wages to a region of low wages. In India, we come down to a region where the wage-level is so low that the multiplied power of human muscles, or the multiplied power of very weak cattle, supersedes all but machinery of the very lowest order. Wages are rising, and will continue, with civilising influences, to rise still more; but until they do, the question of increasing the products of the country by the application of machinery must be considered a secondary one. The first and primary question is, how far it may be possible for the Government to increase the effective working power of the two flesh and blood machines—the men and their cattle—and thus fulfil a duty which a feeling of humanity, as well as a desire to develop agricultural wealth, impose upon it. The system of agriculture is eminently one of *petite culture.* It will be exaggerating very little to say that the country is split up into so many millions of five-acre farms. The holders of these farms are small tenants paying rent, over a large part of India, direct to the State, and, over a still larger part, to a

landlord, or a landlord intermediate between them and the State. As a rule, the cultivator will do anything that is necessary within the boundaries of his own five acres; it is a delicate matter to meddle with him there. But outside his five acres he can do nothing; and as (with due regard to certain bright exceptions) the intermediate proprietor avoids doing anything, it devolves upon the Government to take whatever measures may be possible and expedient—(1) to prevent the deterioration of the working power of the agricultural machine, and (2) to improve its working power. Five years ago, England sent a message to India that the people must not be allowed to die of starvation. But Sir James Caird and General Strachey, who bore that message, found that much more was necessary than to provide the starving people with food when famine was on them. It was necessary, they found, to secure to them a normal condition of strength and health; and the consequence was that the exhaustive report, written when the labours of the Famine Commissioners were concluded, by their able Secretary (Mr. C. A. Elliott), suggested administrative reforms of all kinds, which, at first sight, had little to do with the question of famine, but which, on examination, were found to have very much to do with it indeed. For the whole country being built up, as it were, of those five-acre bricks, it is found that all administrative problems, however intricate, can be resolved into factors in which the five-acre unit, and the prosperity of the five-acre holder, is the most important one of all.

"The net result of the Famine Commissioners' mission was a further message to India from Her Majesty's Secretary of State, inviting closer inquiry into vital and economic facts, and the adoption of measures tending to increase the produce of the country as well as to cope with famine. The words in which Lord Ripon gave this message to the country, show that His Lordship considered that to strengthen and improve the condition of the cultivators was the leading measure necessary for the increase of agricultural wealth:—

"'It is necessary to point out that the agricultural inquiry should not be confined to the mere collection or collation of statistics in the ordinary acceptation of the term. An examination of the portion of the Famine Commissioners' Report which deals with agricultural inquiry will show that, in recommending with reiterated force an intelligent system of investigation, their final object is to urge through its means, and as a practical outcome of its results, the policy of maintaining agricultural operations at the highest attainable standard of efficiency. The Government of India fully accepts this definition of a most important aim of agricultural inquiry. The maintenance of agricultural operations implies the sustenance of agricultural labour, and the complete provision of agricultural requirements; and in India this means that cultivators, their families and cattle, must be properly fed, and their need for labour, irrigating machinery, and agricultural implements adequately met. Now, insufficiency of food, as well as the deterioration or lack of mechanical appliances, must diminish the effectiveness of labour, and thereby reduce the produce of the country. If, therefore, through rack-renting or any unsuitable system of collecting rent, if from inability to obtain capital on reasonable terms, or if from accidents of season and other causes, the amount of produce becomes less than sufficient to provide the sustenance and appliances required by labour and land, it becomes the imperative duty of Government to ascertain whether any legitimate means can be provided to check the degradation of agriculture which must otherwise ensue. On the other hand, if by any means the efficiency of agricultural operations can be increased, a larger amount of produce will be available both for the support of labour and the provision of mechanical requirements, and also for the rent fund from which the land revenue of the country is derived.'

"It is in the proper application of these principles that the future increase in the production of the country will be effected, and it is in those terrible battle-fields which have been indicated that their application is chiefly needed, in order to enable the cultivator to make a successful stand against desiccation and uncertainty of outturn. The directions in which the State, or landlord-in-chief, is taking measures for the maintenance of the full working power, as well as for the increased efficiency of the great muscular machine, may now be briefly indicated. They are these: The promotion of railways; of canal irrigation, and of well irrigation; the improvement of the revenue and rent systems; the reclamation of waste lands, with the establishment of fuel and fodder reserves; the introduction of agricultural improvements; and finally, emigration.

"On the whole, the expenditure of capital on railways does, by providing the cultivators of precarious tracts with cheaper food when their harvests are insufficient, afford a quicker benefit to a greater number than irrigation or any other measure Government can undertake, and rightly heads the list.

"The next means of aiding the cultivator in his fight against the desiccation caused by the caprices of the monsoon of the year, is irrigation by canals and wells,—*i.e.*, by the utilisation of water stored up by monsoons *of previous seasons* in the mountain ranges, and in underground seas. A very great deal has yet to be done to make these stores further available, notwithstanding the magnificent labours of our engineers. When the Famine Report was written, out of about 200,000,000 acres of cultivated land in British India, only 8,000,000 acres were watered by irrigation works, and 12,000,000 acres by wells. All that can be said is, that every nerve is being strained by our Public Works Department to develop canal irrigation; and next year we shall be able to show you maps of what has been done, and can still be done.

"The next means of increasing the produce is by the reclamation of waste land, and the establishment of fuel and fodder reserves. The two are put together, because it is believed that in the area of precarious rainfall it is wiser to utilise many of the waste tracts by converting them into grazing lands, than to grow crops on them. The Famine Commissioners estimated that there were more than 100,000,000 of acres of cultivable waste in the British provinces, of which, perhaps, one half are in the precarious area. But there are in addition several millions of acres now classed as unculturable, much of which it may also be possible to convert into grazing land. A word or two now about the cattle which form so important a part of the machine of 'flesh and blood,' to which reference has been made. Sir James Caird, in comparing the agricultural condition of Egypt and India, noticed the much larger proportion of the cultivated land in Egypt which is annually employed in the growth of fodder for cattle, and the consequent maintenance of a powerful working stock, capable of deeply stirring the land, and supplying good manure. 'There is nothing of the kind,' he wrote, 'in India. The cattle in most parts are half starved, and their manure is used as fuel.' This is true, unless we except some few fully irrigated tracts. One of the saddest sights in India as we travel for hundred of miles by rail, through that belt of monsoon shrinkage in the second quarter of rainless months, is to see the cattle standing without food, and almost without shade, exposed to a scorching heat, which imagination fails to realise, in the midst of arid plains bare of all sustenance. But when the period of desiccation is prolonged beyond its normal limits to the third quarter, the sufferings of the poor beasts are awful. Meanwhile, the strength of the agricultural machine on which the operations of the forthcoming season depends is, of course, frightfully diminished by every day's delay. Sometimes the delay is, as in 1877, so great that the cattle die in thousands, and even millions. In one district, for instance, 250,000 disappeared out of 500,000. Unfortunately neither railways nor (as a rule) irrigation bring food for cattle. Both railways and water are wanted to sustain the human part of the machine. The only remedy is, firstly, to establish plantations of fodder trees, the roots of which draw on the underground fresh-water sea for their moisture, and protected by which grass and fodder bushes will grow; and secondly, to secure the grazing land from destruction by goats, which are more than anything else accountable for the disappearance of natural cattle food from the country. This measure will not only sustain the cattle power, but by increasing manure, and by supplying fuel to take the place of manure, will add to the richness of the area already cultivated, which will then support a larger agricultural population, and with this advantage, that they will secure a far more certain harvest by improving their present fields, than by raising precarious crops on the now waste lands. The Madras Government has already adopted the above

policy, which the Government of India and other Local Governments are also, in the face of many difficulties, attempting, with the aid of the Forest Department, to introduce elsewhere."

Another means of strengthening the cultivation is by assisting the population of crowded tracts to emigrate either to less crowded tracts within India or to countries outside where coolie labour is required, and this subject will be dealt with in the chapter on Emigration. Finally, there is the possiblity of relieving them by judicious improvements in the revenue and rent systems. These are described in the next succeeding chapter, and it is only necessary to explain in this place that the Government of India, as well as the ruling authorities of those provinces which are most subject to oscillation of outturn, have introduced measures for the prompter relaxation of the Government demand whenever failure of harvest, partial or complete, may render this course necessary for the relief of the agricultural population. A closer return has thus in some degree been made to the old native practice of taking a share of the crop of the year—a practice which, though requiring a very costly machinery and productive of much corruption and harassment to the *raiyat*, is in theory based upon a sound principle. Apt expression has been given to the principle in the following maxim, which is believed to express the ruling idea of the revenue system maintained under the Emperor Akbar :—

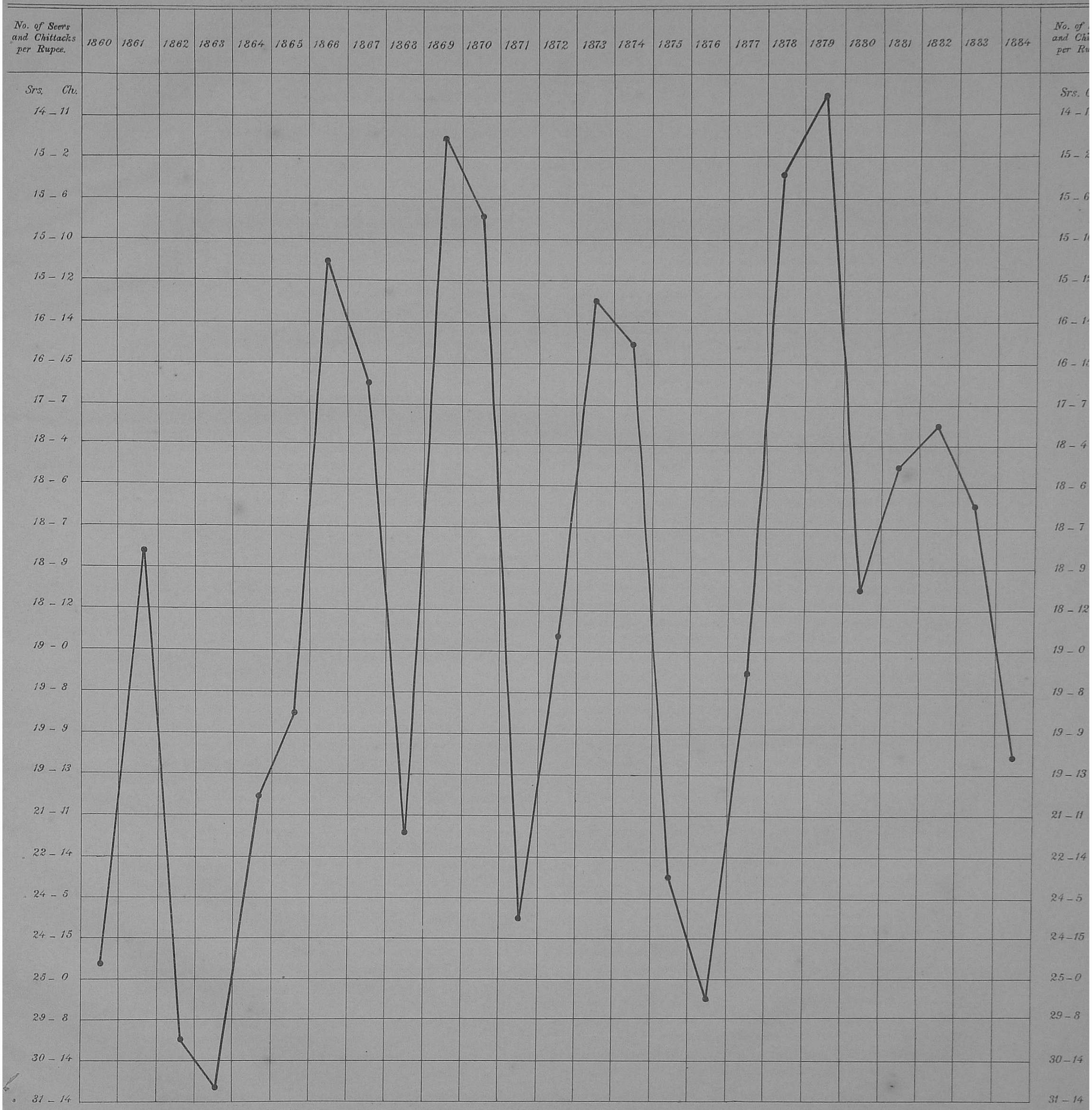
"There shall be left for every man who cultivates his lands as much as he requires for his own support till the next crop be reaped, and that of his family and for seed. This much shall be left to him ; what remains is land tax and shall go to the public treasury."

Crops cultivated, 1884-85.

PROVINCE.	CEREALS AND PULSES.			OILSEED.	SUGARCANE.	FIBRES.			INDIGO.	COFFEE.	TEA.	TOBACCO.	CINCHONA.	MISCELLANEOUS.		TOTAL AREA OF CROPS.	DEDUCT AREA CROPPED MORE THAN ONCE.	ACTUAL AREA ON WHICH CROPS WERE GROWN.
	Rice.	Wheat.	Other food-grains, including pulses.			Cotton.	Jute.	Other sorts.						Food crop.	Non food crop.			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Madras*	5,630,106	30,916	12,877,978	1,169,079	48,813	1,326,718	9,799	15,968	321,339	60,993	4,059	82,673	4,019	915,630	173,861	22,671,981	1,340,307	21,331,674
Bombay	2,031,304	2,211,459	17,761,275	1,976,867	87,670	2,156,768	...	91,576	5,185	37	...	75,538	...	133,894	214,331	26,745,904	779,880	25,966,024
Bengal†	37,500,000	850,000	8,750,000	2,000,000	350,000	300,000	800,000	...	1,300,000	10	50,000	200,000	3,000	800,000	1,600,000	54,503,010	...	54,503,010
North-Western Provinces and Oudh‡	4,894,344	5,031,330	19,897,475	623,298	817,326	1,677,049	...	72,803	410,921	...	10,647	47,093	...	600,845	887,136	34,970,267	2,905,538	32,064,729
Punjab	621,214	7,819,509	13,084,232	1,061,518	335,454	792,996	...	34,845	153,889	...	7,792	54,996	...	290,145	417,025	24,673,615	2,119,914	22,553,701
Central Provinces	3,091,625	3,541,467	4,299,482	1,632,822	44,284	459,348	7,244	120,618	126	...	...	16,208	...	471,135	39,617	13,723,976	688,677	13,035,299
British Burma	3,630,340	2,644	6,764	30,013	7,334	8,621	36	894	10	...	159	18,187	...	280,132	59,305	4,044,439	5,193	4,039,246
Assam	1,070,390	...	47,507	146,837	17,738	579	248	...	...	100	189,852	257	...	...	189,043	1,662,551	150,525	1,512,026
Coorg	73,616	...	1,577	...	...	...	...	...	...	60,338	...	...	2,012	...	366	137,909	547	137,362
Berars	21,784	819,057	2,646,513	842,955	4,482	1,959,402	7,497	...	...	...	...	21,471	...	...	149,795	6,472,956	...	6,472,956
Ajmere	608	21,842	150,583	7,500	1,908	8,761	...	...	...	...	...	96	...	2,056	6,263	199,617	...	199,617
Total	58,565,331	20,328,254	79,523,386	9,490,889	1,715,009	8,690,242	824,824	336,704	2,191,470	121,478	262,509	516,519	9,031	3,493,837	3,736,742	189,806,225	7,990,581	181,815,644

* Figures given for Raiyatwari lands and Inam holdings only. † Figures for Bengal are approximate. ‡ Figures given for temporarily-settled districts only.

Diagram showing rise and fall in the price of Wheat in Cawnpore during the years 1860 *to* 1884.



NOTE—1 Seer = 2·0533 lbs avoirdupois.
1 Chittack = 0·1283 „ „

Lithographed at the Survey of India Offices, Calcutta, March 1886.

CHAPTER VI.

REVENUE AND RENT SYSTEM.*

BY Hindu law and practice in times previous to the subjugation of India by the Muhammadans, the king or ruler of any territory, whether a great monarch or a petty chief, was entitled to a share of the produce of cultivated land. This due was generally converted by the Muhammadan conquerors into a cash tax or rent. The most extensive measure which effected this change was the celebrated settlement of Akbar. It was based upon a field survey, and its principle was the assessment of the value of each field in cash. The assessment was fixed at one third, or in some places apparently at one fourth, of the average gross produce of the field, according to the average prices obtaining over a series of preceding years. The assessment thus ascertained was fixed for ten years, during which period the cultivator was to have the full returns of his own improvements, and was then liable to revision on similar principles. In joint villages, the community was mutually responsible for the total revenue assessed on the village lands. In the reign of Aurangzeb, the land revenue appears to have been administered on principles more or less closely resembling those introduced by Akbar over the greater part of the territories under the direct administration of the Mughal Emperors or their deputies. In Bengal, however, the revenue was generally collected by contractors, sometimes the representatives of ancient chiefs, sometimes mere speculators. And in Southern India, which did not come under Musalman rule till a late period, the ancient Hindu principle as to the right of the ruler to an actual share of the produce, usually a very large one, was generally maintained. But the cultivators were often required to pay in cash the value of that share at rates annually fixed with reference to the current prices of produce.

The enlightened system of Akbar did not survive the break-up of the Mughal Empire. During the period of anarchy which lasted from the death of Aurangzeb till the commencement of the present century, every power which became predominant, and especially the conquering Mahrattas, endeavoured to extort the utmost possible from the landowners or cultivators. To better effect this object, the farming, or, in the technical sense of the word, the *zamindari* system was extensively employed throughout almost all India. The right of collecting the land revenue of a certain tract, village, *pargana*, or district, was sold to the highest bidder for a short term. The contractor often sub-let portions of his farm on similar terms, and his lessee frequently again sub-let; so that the cultivators had to pay, in addition to the exorbitant demands of the Government, the profits of a series of middle-men. As this practice has left deep traces on the revenue system and economic conditions of most provinces, it is important to notice that under it the cultivators were often able to maintain some reference to the old or established rates of assessment, the additional demands upon them being levied by extra cesses or by separate rates on the land; and that the contractors frequently succeeded in getting their farms renewed for successive periods, till they established a sort of hereditary title to them.

On the introduction of British rule in each province, it was soon found necessary, in the interests both of the State and of the people, to supersede this oppressive system by what are technically called 'settlements' of the land revenue, by which its amount is determined, and also who is to pay it. As regards the latter point, the policy of the British Government has always been to encourage proprietorship, and the person who is made directly responsible for the payment of the State demand on any land is considered to be its owner, though his proprietary right is, or may be, limited on the one hand by the right of State to its revenue; on the other, by interests in the land subordinate to his. The varieties of land tenure found in existence by the British in different parts of the country gave rise to three distinct systems of settlement, since the general rule was that the person having the highest existing interest in the land should be made responsible for the revenue. For in some provinces, the present cultivators, who everywhere in India till the land in *petite culture*, hold immediately from, and pay their rent or revenue directly to, the State. In others, they hold from, either with or without some occupancy right, and pay rent to, private persons who may be shortly, though not altogether accurately, called the landlords. Elsewhere, they are either members or tenants of a village community which jointly holds from and pays to the State. On these three distinctions are based the three great varieties of settlements.

In the Bengal provinces which came earliest into the possession of the East India Company, as well as in some later acquisitions, especially in the eastern territories, two classes were found in possession of distinct interests and responsibilities in the land: (1) the peasant cultivators as tenants and rent-payers; (2) the superior holders (sometimes the descendants or representatives of ancient nobles, sometimes of military chiefs, in other cases of middle-men or farmers of the revenue) as landlords, receiving the rent and paying the revenue. Under this state of things, the settlement was made with the latter class, the *zamindars*, *talukdars*, or *malguzars*, and it is hence called the *zamindari* settlement. This system prevails especially in Bengal, in the north-east districts of Madras, in Oudh, and in the Central Provinces.

In the greater part of Southern and Western India, there existed no class with any permanent or hereditary right which intervened between the right of the peasant to till the soil and that of the State to receive the revenue, while, speaking generally, the village communities were not bound together by joint or mutual responsibility for the revenue, and each cultivator was answerable only for the fields he himself held. The settlement was therefore made with individual *raiyats*, and is hence called *raiyatwari*. It prevails in the greater part of the Madras and Bombay Presidencies, in Berar, and, with some modifications, in Assam and in Burma.

A third or intermediate system is common in other parts, especially in the Punjab and the North-Western Provinces. The village community, apparently introduced by the Aryan settlers into India, is of two kinds, the simple or non-united, and the joint, both of which forms are still in existence. The former, under which the land is held in severalty, prevails in Western, Southern and Eastern India, and is perhaps the oldest; but by a process of disintegration on the one hand,

* Quoted from a memorandum written by Mr. W. G. Pedder, Secretary, Revenue, Statistics, and Commerce Department, India Office, for the 19th number of the Statement of the Moral and Material Progress and Condition of India.

and from the effects of the rules of Hindu inheritance and of our revenue system on the other, the two forms have some tendency each to approximate to the other. Under the joint form, the village lands belong to the village community, the descendants or representatives of the original founders, as a body linked together by an ancestral bond of union, and jointly responsible for the payment of the village revenue. Though the common property of the community, the lands are mostly cultivated by its members in severalty, but such as are not needed by members are let to cultivators not belonging to the proprietary body who are its tenants. Where then the joint system prevailed, the settlement was made with the community as a body, and this is the village system of settlement.

As regards the determination of the amount of the Land Revenue.—On the assumption by the East India Company of the direct administration of Bengal in 1772, the settlement was, as has been said, made with the *zamindars*, and their estates (or more accurately the right of collecting the payments of the cultivators) were leased to them for terms of years at fixed annual sums determined chiefly with reference to what they had been paying to the Native Government, and believed to represent approximately from eight tenths to nine tenths of what they actually received from the *raiyats*. It was intended to ascertain more precisely the real value of each estate before the leases expired; but this proved impracticable from a variety of causes—the want of anything like a survey, the absence of village accounts said to have been destroyed during previous troubles, the disclination both of the *zamindars* and of the *raiyats* to give accurate information, and the ignorance of the British officials, new to revenue work. Hence the leases were renewed quinquennially till 1791. In that year decennial leases, at sums not materially differing from those of the former leases, were given. But in 1793, Lord Cornwallis declared the *zamindars* proprietors of their estates at annual assessments fixed in perpetuity at the amount payable under the decennial leases. Similar settlements were effected for the Province of Benares in 1795, and in what are now known as the *zamindari* tracts of Madras in 1802; and the application of the same measures to other British acquisitions was contemplated. But early in the century different views began to prevail, chiefly under the influence of Sir T. Munro, and it became admitted that the principles of the Bengal settlement were erroneous, or at least not everywhere applicable. From this time therefore settlements were periodical, the amount not being fixed in perpetuity, and an attempt was made to determine the assessments more accurately with reference to the value of the land.†

Both in the North-West Provinces, in Bombay and in Madras, the principle adopted for the determination of the amount of land revenue in the earliest regular settlements was that of a percentage on net produce. It was attempted to ascertain for each field, or at least each class of land, the average gross produce and its value, and to eliminate therefrom the net produce (*i.e.*, the amount remaining after deducting cost of cultivation and profits of stock), a proportion of which was to be the Government assessment. This principle proved an entire failure in the North-West Provinces, and was formally abandoned by Regulation IX of 1833. Upon it was based Mr. Pringle's abortive settlement of the Bombay Deccan about 1830, which utterly broke down. It has never been applied in the settlement of territories such as the Punjab, Oudh, the Central Provinces, which came under British rule after 1840, and the only province in which it is still, at least nominally, maintained, is Madras.

Under the Madras system the average yield of certain staple crops per acre of each class of land is ascertained by a great number of actual experiments extending over a series of years. The average gross produce thus determined is converted into cash at the 'commutation rate,' or average harvest price of the 20 or more years preceding settlement. The average cost of cultivation and profits of stock are then ascertained by careful and extensive investigation, and the amount arrived at being deducted from the value of the gross produce, the balance is net produce. Half the net produce is the 'revenue rate' per acre, or Government cash assessment, and the quantity of grain representing this sum at the 'commutation rate' adopted is the 'grain assessment.'

Such is the theory of the Madras Settlement. In practice, however, it has been found impossible or dangerous to adhere to it strictly. In the first place, the difficulty of determining with accuracy the average yield of land is great; next, the only way of finding the average cost of cultivation is to ascertain what it would cost to cultivate a given holding by hired labour, and, as this labour would be needed for only a certain number of weeks or months, it is obvious that nothing would be allowed as wage for the subsistence of the cultivator and his family during the rest of the year. Hence the first step in a Madras settlement practically is to determine, on general considerations (such as those to be described under Bombay), whether the tract coming under settlement requires a decrease or will bear an enhancement of its land revenue, and to what extent. The total amount of assessment to be imposed having thus been decided on, the results of the process above described are adjusted so as to yield it. The estimates of average yield are reduced to allow for error or for exceptionally bad seasons, and the commutation rate is lowered to cover possible fluctuations of prices in the future. In practice, therefore, the elaborate process above described determines rather the relative than the absolute assessments of different classes of land, and the Madras method does not really differ very widely from that of Bombay.

The Bombay method is avowedly an empirical one. When a tract (usually the *taluk* or sub-division of a district) comes under settlement, original or revised, its revenue history for the preceding 30 or more years is carefully ascertained and tabulated in figured statements and diagrams. These show in juxtaposition, for each year of the series, the amount and incidence of the assessment, the remissions or arrears, the ease or difficulty with which the revenue was realised, the rainfall and nature of the season, the harvest prices, the extension or decrease of cultivation, and how these particulars are influenced by each other. The effect of any public improvements, such as roads, railways, canals, markets, on the tract, or on parts of it, is estimated. The prices for which land sold, or the rents for which it is let, are ascertained; and the tract is compared as regards the above particulars with other tracts similar to it in soil, climate, and situation. Upon a consideration of all these data the total assessment is determined. That amount is then apportioned pretty much in the same manner upon the different villages; and the total assessment of each village is then distributed over its assessable fields in accordance with their classification, which determines their relative values in point of soil, water-supply, and situation.

† *Note.*—The following table gives the area under Permanent and Temporary Settlement in each Province.

	Area in Square Miles.			Area in Square Miles.	
	Permanent.	Temporary.		Permanent.	Temporary.
Madras	40,577	99,199	Central Provinces	...	85,892
Bombay	...	124,398	British Burma	...	87,220
Bengal	*145,457	*10,504	Assam	*50,024	*528,047
North-Western Provinces and Oudh	10,647	95,329	Coorg	...	1,582
Punjab	...	107,010	Berar	...	17,711

* These figures represent the number of estates, the area not being given.

It will have been seen that the rent for which land actually lets is one of the minor elements taken into consideration in deciding on the amount of Bombay assessment. To base the assessments chiefly on existing rents would be impossible where, as in Western and Southern India, the proportion of land let is almost infinitesimal in comparison with that of land cultivated by its owner. But this is not the case in Upper India, where a large though varying proportion of land is let out to tenants, and where there exist distinct classes of rent-payers and rent-receivers.

When, about 1832, the Government of India determined finally to abandon the attempt to ascertain the net produce of land for the settlement of the North-West Provinces, they decided to substitute as the basis of the assessment of each estate its actual 'assets'—that is to say, where the land is let out for cultivation, the rents actually paid by the tenants (unless obviously inadequate in particular cases, when a 'fair rent,' founded chiefly on the prevailing rates of rent, is substituted for the purpose of the calculation); where the land is cultivated by its proprietor, its fair rental value, assumed on a consideration of the prevailing rent-rate of similar lands let in the vicinity and of other circumstances. The former method of calculating the assets is naturally that chiefly relied on in Oudh, where there are large landlords; the latter, among the village communities of the North-West Provinces. These methods are considerably modified in the Punjab and Central Provinces settlements, and where rents are chiefly paid in kind, and sometimes approximate to the Bombay plan. But, speaking generally, whatever the exact method employed, the principle of settlements throughout Upper India is to ascertain the rental value of each estate, and to fix a proportion of that value as its assessment. In the original North-West Provinces settlements (made *circa* 1833–44 for 30 years) this proportion was two thirds; on revision it was reduced to one half, and the latter proportion is now universally adopted in the settlements of Upper India, though to it must be added the local cesses, about 10 per cent. of the assets.

One difference between the settlement of a village of peasant proprietors in the *raiyatwari* provinces and that of a proprietary village community or *zamindari* village of Upper India must not be overlooked. In the latter, the whole area of the village lands belongs to the community or proprietors, who dispose of the waste as they choose. In the former, each peasant is the owner of his own holding only; the unoccupied waste belongs to Government, and is, when necessary, given out for cultivation at fixed field rates. Consequently the revenue of a *raiyatwari* village may increase during the currency of a settlement from the cultivation of waste or decrease from the resignation of cultivated fields, but not that of a proprietary community; and hence there are greater variations during the currency of a settlement in the land revenue of a Bombay or Madras District than in a District of Upper India. Finally, it will be observed that, with insignificant exceptions, there is no longer such a person as a tenant of the State. In the *raiyatwari* provinces, the Government tenant has been converted into a peasant proprietor. Elsewhere, the cultivator, if not himself a proprietor, is a tenant of the *zamindar* or of a proprietary body.

The above sketch will give some idea of the origin and nature of the Indian land revenue system. There remain two or three points which have come prominently into notice during the past decade.

The first of these is the question of the comparative incidence of ancient and of modern assessments. It has been shown that the assessment of Akbar was usually the average value of one third the gross produce. The net amount of the land revenue in A.D. 1580, when this settlement was in force, from the 13 provinces north of about latitude 20 degrees, was about 1,320 lakhs of rupees. The existing land revenue in the same provinces is now about 1,400 lakhs. The assessed or cultivated area of the provinces is believed to be now much larger than in 1580, while the purchasing power of silver, expressed in the prices of the staple food-grains, appears to have fallen about three fifths. In A.D. 1697 the land revenue had risen immensely, partly from extension of territory, partly from increase of cultivation, rise of prices, or heavier exactions, and is said to have amounted to 3,759 lakhs, from 22 provinces, inclusive of some territory now Native States, but exclusive of the greater part of Madras. The total land revenue of British India is now 2,190 lakhs. The Famine Commission (page 112 of Part II. of their Report) framed a careful estimate of the present incidence of the land revenue in different provinces, and found that the percentage of the assessments to the value of gross produce varies from 3·8 per cent. in the Central Provinces and 3·9 per cent. in Bengal, to 7·6 per cent. in Bombay, and 7·8 per cent. in the North-West Provinces and Oudh.

This estimate is supported, as far as the Bombay Presidency is concerned, by the returns of the cotton trade, which show that the value of the produce of less than one tenth the cultivated land of that Presidency is equal to nearly double the total land revenue. In Upper India, the fact that modern assessments are based on half the ascertained rent of land, while in the last century they absorbed the full rent, and even trenched upon the profits of cultivation, points in the same direction.

Whatever may be the precise value of the estimates of the Famine Commission, it is certain that the incidence of modern assessments is much lighter, not only than that of the oppressive imposts which they superseded, but than that of the reasonable rates of the early Mughal rulers. The difference has been brought about, partly by an absolute reduction in the amount of assessments effected by the first regular settlements, partly by subsequent increase of cultivation, and, to a great extent, by the general rise of prices which has occurred since about 1850, the result, in great measure, of the investment of capital by the State in public improvements, such as roads, railways, and harbours. Of late years, the question to what extent, on the revision of periodical settlement, the assessment should be raised upon the latter considerations has become one of much practical importance, especially in Western India.

The second question to which reference is here necessary has a close connection with the above. It is that of the policy of permanent settlement.

The Bengal settlement of 1793 was not only *zamindari*, but its assessments were fixed for ever in amount. It is not, however, essential to the principle of a *zamindari* settlement that the amount of land revenue should be unchangeable; nor, on the other hand, to that of a *raiyatwari* or village settlement that the amount should be liable to periodical revision. Lord Cornwallis fixed the revenue of Bengal in perpetuity for political and economical reasons which appeared to him adequate, and when the *zamindari* principle was abandoned for the settlement of later acquisitions of the East India Company, it seems to have been doubted whether the principle of perpetuity was not also erroneous, or at the least premature. There always existed, however, an influential party among Indian administrators or economists who held that the land revenue should be generally made perpetual in amount; and in 1862 Sir C. Wood decided to sanction a permanent settlement whereever the existing settlement was equitable, and where no considerable increase was to be expected in the revenue. These conditions, it was anticipated, would be found to be fulfilled in the greater part of Upper India. The reasons which led to this decision may be briefly stated as follows: It was considered that permanency of assessment would bind the landowners to the Government which had granted, and which alone would maintain, so great a boon; that it would encourage the investment of capital in land, and therefore the growth of a middle class; that it would lead to more lenient and considerate treatment of the tenants by the landlords, and would thus promote general prosperity, and consequently an increase of commercial and general, as well as of agricultural wealth; and hence, that the sacrifice of a prospective increase of land revenue would be made up by increased ability of the population to contribute to general taxation, especially to the indirect

taxation which was then thought to afford the most legitimate and least injurious mode of filling the Treasury.

Great practical difficulties in carrying out the measure soon became apparent. In 1864–65 it was decided that it could not be applied to estates or villages in which the cultivated did not amount to four fifths of the cultivable area. Immediately after this decision, the great extension of Government works of irrigation in Upper India made it apparent that an estate actually irrigated from a Government work at the introduction of the settlement would be permanently assessed much higher than one to which irrigation was extended after it had been permanently settled. It was therefore decided, in 1866 and 1867, that the permanent settlement should be applied to no estate in which there was a prospect of irrigation within 20 years likely to increase the assets more than 20 per cent. Finally, in 1870-71, a still more important point was raised by the Lieutenant-Governor of the North-West Provinces, that of the adequacy of the standard of rents on which the assessments to be made permanent were based. The Government of India were much struck with the importance of this view, which, they pointed out, raised new questions of the utmost gravity. It postulated, as the condition of his receiving a permanent settlement of his estate, that the proprietor should be receiving a full rental. But it was not desirable in the interests either of the State or of the public, that tenants generally should pay rack-rents; that the restrictions placed by law or custom on enhancement of rents should be done away with; that rights of occupancy should cease. It was also undesirable that, cash assessments being fixed, proprietors should receive the whole advantage of a natural and proper increment of rents due to general progress, and in no degree to their own improvements.

The principles on which the conditions above mentioned of a permanent settlement were based, were: first, that no improvements made by the landholders should occasion any increase of assessment—this was, in theory at least, admitted by every one; second, that the State should not sacrifice that share of the increased profits of land which would, within a period which could be easily foreseen, result from improvements by the State. Irrigation was the only improvement directly contemplated; but in reality there were many other improvements made by the State, such as railways, roads, the opening out of markets, which would equally increase the value of land. And besides such improvements made directly at the cost of the State, the immense economical revolution through which India was passing, the diminution in the value of the precious metals, and the enormous increase in the prices of produce, was adding, without any expenditure of labour or capital on the part of the landholder, to the value of land to a degree which was not apparent when a permanent settlement was decided on.

The Lieutenant-Governor was therefore requested to reconsider the whole question of a permanent settlement for the North-West Provinces, and the Secretary of State was asked, pending the report, to hold in abeyance the existing orders regarding the introduction of a permanent settlement. They had in no instance been acted on, the proprietors of land in Upper India had taken no interest in the subject, and they could not be put in force without the most serious and certain injury to the future interests of the public.

Views similar to these of the Government of India had been urged before the Select Committee of the House of Commons on Indian Finance, who, in 1871, recommended that further proceedings to carry out a permanent settlement should be suspended till the subject had been reconsidered; and instructions to this effect were sent to the Government of India by the Duke of Argyll.

The enquiry made in Upper India under these orders showed that the opinion of the great majority of the officers consulted was unfavourable to a permanent settlement; and the Lieutenant-Governor of the North-West Provinces (Sir W. Muir) remarked that though he believed a permanent settlement had many advantages, he could not advocate a gratuitous sacrifice of the interests of the State, which it was now clear was involved in the measure. He suggested, therefore, for adoption principles which, he believed, would secure most of the advantages of assessments fixed in perpetuity, while reserving to the State a share in the increased returns from land which arise, not from private improvements, but from the general progress of the country—from, that is, the 'unearned increment.' These principles, it will be seen, have since been generally adopted.

The Government of India passed no immediate orders on Sir W. Muir's report, and nothing further was done in the matter till 1882. But, meanwhile, the objections to absolute perpetuity of assessments became more apparent. In 1862, it was believed that no very considerable increase in the temporarily-settled land revenue was probable; but since that date, this revenue has risen by $17\frac{1}{2}$ per cent.—an increase without which numerous improvements in Indian finance and administration could not have been effected. A change in fiscal policy has greatly diminished the sources of indirect taxation, an improved yield of which anticipated from the increase of general wealth due to a permanent settlement was relied on to compensate the Treasury from any prospective sacrifice of land revenue. It seems likely that the general dislike of additional direct taxation would outweigh the popularity of a permanent settlement among the landowning classes. The experience of the provinces which have been for three generations under a permanent settlement, has not been that their general condition is better, their wealth greater, their contributions to general revenue larger, than those of the temporarily-settled provinces; nor that fixity of the Government demand on the landlords had led to more considerate treatment by them of their tenants, to improved cultivation, or to greater agricultural prosperity.

In 1882, therefore, the Government of India determined finally to abandon the policy of the extension of the permanent settlement. At the same time, they considered that the existing system of complete periodical re-settlements involved several evils, the most prominent of which are the uneasiness arising from uncertainty, the risk of undue enhancements, the annoyance to the people and cost to the State of field operations and detailed enquiries into the returns of landed property, and the check to expenditure on improvements. These evils, it was thought, might in the main be avoided without incurring the disadvantages of assessments absolutely fixed in perpetuity.

It has therefore been decided that, in the first place, the rule already existing, but which, on the half-assets principle, has not always been observed, shall be effectually enforced, that assessments shall not be enhanced on account of improvements made by the owner or cultivator. Subject to this rule, where experience has shown existing settlements to be reasonably adequate and equitable, there will be no general revision of the field work, and assessments will be revised on three grounds only—extension of cultivation, increase of produce due to improvements made by the State, and rise of prices, enhancements on the latter ground being strictly limited.

These principles, which have been in general accepted by the Local Governments and approved by the Secretary of State, will for the future govern the revision of periodical settlements throughout India.

CHAPTER VII.

FOREST CONSERVATION.

FORESTRY in India is a comparatively modern institution. In former times no doubt considerable areas were scrupulously protected in many parts of the country; but, wherever this was the case, the forests were kept as game-preserves for the pleasure of kings, princes, and great nobles. The idea of conserving forests in order to maintain an uninterrupted supply of forest produce useful and even necessary for the people,—the idea of maintaining a proportion of the country under forests on account of the indirect benefits conferred on the Empire at large by the very existence of forests,—was never thought of by former Governments. Even during the earlier times of British sway, the economic value of forests was not recognised, and they were considered more in the light of impediments to the increase of cultivation, and consequently to the general prosperity of the Empire, than otherwise. This period, however, has passed away, and the necessity for the maintenance and conservative treatment of forests, as a mainstay of agriculture, is now almost universally recognised, while Forest Conservancy is regarded as a duty of the State.

India is not a forest-growing country throughout, like Europe; its position in a tropical and sub-tropical climate prevents this, and areas which, with a lesser evaporation such as takes place in temperate and cold zones would be clad with dense forest growth, are here arid and may even be desert. Thanks, however, to the barrier which, in the form of the Himalayas, separates India from the rest of the Asian continent, and in consequence of the pronounced peninsular formation of the Empire, the greater part of the country is suitable for the growth of natural forests. India is a country of extremes, and contains, on the one hand, evergreen forests of a luxuriance and density such as imagination can hardly paint, and, on the other hand, deserts. The distribution and character of the Indian forests is due, in the first instance, to the more or less plentiful supply of rain, and next to elevation, frost, and the influence of the tides. The distribution of the rains in India into distinct periods is as marked and accentuated as anywhere in the tropics, and, thanks again to the formation of the continent, the monsoons extend far north of the Tropic of Cancer. As shown in the 3rd Chapter there are two monsoons, the more important being the summer or south-west. Within the direct influence of the full force of the monsoon rains, the country is covered with evergreen forests; where the rainfall gets less copious, these change into deciduous forests, gradually blending with still decreasing rainfall into dry forests, and ending in deserts.

The evergreen forests created by the influence of the south-west monsoon occupy the west coast of the peninsula, up to the ridge of the mountain chain separating the moisture-yielding sea from the rest of the continent. They take, in the same way, possession of the coast districts of Burma and Chittagong, and spread themselves out on the foot and lower slopes of the eastern Himalayas. The evergreen forests, due to the winter or north-east monsoon, occupy the Carnatic.

The deciduous forests, which occupy the larger part of the peninsula and Burma and a considerable proportion of the Andamans, are of the greatest importance for the forester, the consumer, and the State. They contain the well-known and most valuable species of timber, such as teak, sal, ironwood, sandalwood, red sandur, and many others; also the padouk (*Pterocarpus indicus*), which is found in considerable quantities and of large dimensions in the Andaman Islands. This tree has, of all Indian timber trees, probably the most promising immediate future. It yields the best wood for ordnance purposes and carriage-building, and is sure to rival mahogany for cabinet-work. The timber is stronger than teak in every direction, lasts longer, is much handsomer, does not warp in seasoning, and only weighs 15 to 20 ℔ more per cubic foot.

The dry forests are situated in Rajputana and the Punjab, and spread over a large extent of Native States. Towards the north and north-west they become richer and gradually blend into deciduous or alpine forests, whereas they get drier and drier towards the west and south-west, and disappear into the deserts on both sides of the lower Indus, where the courses of perennial rivers alone are fringed by a belt of arbori-vegetation.

Alpine forests are found within the Indian Empire along the whole of the Himalaya mountain chain from Assam to Hazara, in the mountains of south Afghanistan and Baluchistan, and on the higher mountain ranges in Burma.

The tidal forests are situated along the greater part of the coast of India and in the deltas of its rivers.

The foregoing are, shortly summarised, the physical capabilities of India as a forest-growing country, and there can be little doubt that in pre-Vedic times the greater part of the country was covered with dense forests, which were gradually opened out by Kshatriya settlers along fertile valleys and main streams. At that time and long after, the country was probably more fruitful and the climate less fierce than now, at least if any trust can be placed in the descriptions of Fa-Hian, the great Chinese traveller who visited India in the fourth century, and who described the climate as neither hot nor cold. The destruction of the forests on a larger scale was left to the invaders from the north—nomadic tribes who had been accustomed to roam from pasture to pasture, and who fired alike hills and plains and destroyed the forests wherever they went. The sway of these northern invaders extended over upwards of 750 years, and when, after the battle of Plassey, the foundation of the present Indian Empire was laid, and province after province was added, the forest areas had already, over considerable portions of the country, been reduced below the minimum necessary for its well-being, though other portions of the vast empire were still covered with almost virgin forest.

British rule, instead of putting an immediate stop to further devastation, gave in the beginning a new impetus to destruction. As already stated, the watchword of the day was to increase the area of cultivation at the cost of the still existing forests, and this was carried on for years without any enquiry into the merits of each case. Naturally, incalculable harm was done by such inconsiderate destruction of

forest, especially in the more populated districts, where the demand for new land was greatest, and where the forests were often already less than the state of the country demanded. Large areas, though not immediately destroyed, were alienated by settlements and grants, and were thereby withdrawn from further active interference on the part of Government. Security to life and property enabled the peasants and herdsmen to graze their cattle far from their homes and unprotected, and at the same time such cattle increased in value. Herds naturally increased, and additional grazing areas being required, were cleared by fire, thereby opening the gate to future famines and distress. Railways soon spread over the country, and forest growth disappeared with an incredible rapidity within the reach of their influence, partly on account of the direct demands made on them for construction works—demands which were frequently supplied in a wasteful and reckless manner,—partly on account of the increased impetus given to cultivation.

It was only when failures to meet local demands for public works were brought to notice that the value of the forests was gradually recognised. At first attempts were made to meet such local failures by local measures; but the insufficiency of this was rapidly brought to light, and it came to be understood that a question of such general magnitude and importance could only be efficiently grappled with by a special organisation. It was thus the Forest Department came into existence.

As a matter of course, it rested with the Government to show the lead, and the first step in the new direction was naturally to ascertain the extent of the forest property still remaining in the possession of the State, and to what extent such property was burdened by rights. The Oriental Governments, from which the British Government inherited its forest property, never recognised the accrual of any prescriptive right; but, on the other hand, anybody was accustomed, without let or hindrance, to get what he wanted from the forest, to graze his cattle where he liked, and to clear jungle-growth for cultivation wherever he listed. This state of things, it is self-evident, did not permit of systematic forest management, and it became clear that a Forest Law and a Forest Settlement were urgently required. It was necessary that the Forest Settlement should define the forests in which the right of the State was still absolute; forests which were the property of the State, but which were burdened with legal rights, prescriptive or granted; and forests the property of individuals or communities, but in which the State had rights over all or certain kinds of growing trees. After several local Rules and Acts had been introduced and had been in force for a longer or shorter time, the first Indian Forest Act was passed in 1865. This was, however, found wanting in many important respects, and was replaced by the Act of 1878. Even in this new Act, however, faults were at once recognised, and separate Acts were passed for Burma and Madras in 1881 and 1882 respectively. All three Acts provide for the formation of Government reserves and the settlements of rights within them, also for the constitution of village forests; and they contain forest police rules necessary for the protection of Government forests and forest produce. The Indian Forest Act contains in addition provisions for the creation of protected forests. All three Acts provide for the control over forests not belonging to the State, if such control appears necessary for the public weal, or if the treatment which such forests have received from their owners injuriously affects the public welfare or safety; but these provisions are modified by somewhat impracticable conditions of forced purchase. The Acts are still open to many improvements.

In the Central Provinces and Bengal, forest reservation had made the most rapid progress, in both instances under the wise guidance of Sir Richard Temple, and large areas could at once be declared State forests under the Act of 1878. The rapid strides forest reservation has made in Bombay are due to the wisdom and foresight of the same eminent statesman. Other provinces have followed the same line with more or less vigour. The comparative results of all Forest settlements at present completed or in progress may be gathered from the following table :—

PROVINCE.				STATE FOREST PROPERTY AND WASTES, IN SQUARE MILES.											
Name.	Total area, in square miles.	Area, in square miles.		Total Government Forest and Waste-land.	Under Departmental control.					Forests not under Departmental control.	Percentage of Reserves.		Percentage of Protected Forests.		Village Forests.
		Cultivated.	Waste and Forests.		Reserves fully settled.	Reserves in which the rights have still to be settled.	Protected Forests with rights sufficiently recorded.	Protected Forests in which the rights have still to be recorded.	Forests not settled under the Forest Act.		To whole Area of Province.	To whole Waste of Province.	To whole Area of Province.	To whole Waste of Province.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Madras Presidency.	90,147*	42,168	47,979	31,340	390	1,547	4,884	..	2,458	22,061	2·15	4·04	5·42	10·18	...
Bombay Presidency.	84,608*	50,781	33,827	23,228	5,798	3,600	1,187	3,825	...	8,818	11·11	27·78	5·92	14·82	...
Bengal . .	†	†	†	...	4,979	218	2,298	...	4,313	...	...	...	...	...	...
North-Western Provinces and Oudh.	105,936	52,193	53,743	27,724	3,429	...	116	...	118	21,061	3·24	6·38	0·11	0·22	384
Punjab . .	106,772	36,922	69,850	21,616	999	293	168	95	3,197	16 864	1·21	1·85	0·24	0·37	...
Central Provinces.	285,892‡	22,679	63,213	19,844	19,440	...	...	...	404	...	22·63	30·75	...	...	...
British Burma .	87,220	6,204	81 016	81,016	3,527	...	...	...	...	77,489	4·	4·35	...	...	...
Assam . .	45,736	3,056	42,680	26,238	2,342	...	233	630	6,390	16,643	5·12	5·49	1·89	2·02	...
Coorg . .	1.583	255	1,328	1,252	238	...	...	...	...	...	15·03	17·92	...	...	...
Ajmere . .	2,178	944	1,234	1,234	145	...	...	...	...	1,089	§16·	§23·9	...	...	...
Berar . .	17,714	11,633	6,032	4,708	1,108	436	...	...	2,820	404	8·72	25·60	...	...	...

* As dealt with in Provincial Administration Report.
† Not given in Provincial Administration Report.
‡ Exclusive of Zamindaris.
§ Calculated on the area of Khalsa lands only, over which alone Government has a proprietary right.

The organisation of the Forest Department was gradually developed at the same time under the energetic management of Mr. D. Brandis. The Department as at present constituted is divided into a Controlling Staff (including Conservators, Deputy Conservators, and Assistant Conservators), an Executive Staff (comprising Sub-Assistant Conservators and Forest Rangers), a Protective Staff (composed of Foresters and Guards), and an Office Staff. The Controlling Staff numbers at present 169 officers, of whom 50 per cent. have received a scientific training in forestry and were appointed in England by Her Majesty's Secretary of State. Most of these officers were trained in France, some in Germany; but in future the training of such officers will take place at Cooper's Hill College. The forest range is the unit of the present organisation, and the men intended for such charges are trained in the Indian Forest School at Dehra Dun in the North-Western Provinces. The organisation of the Controlling Staff may, excepting in the newly-conquered province of Upper Burma, be considered as almost completed; but this cannot be said of the Executive Staff, which must ultimately form the mainstay of forest administration in India, and which requires considerable additions in almost every province.

The protection of forests in which previously to the creation of the Forest Department no restrictions of any kind existed, was, as may be supposed, a matter of the greatest difficulty. Boundaries were defined where no boundaries previously existed, or at least boundaries which had never formed a restriction had under the Forest Law to be respected. Previously anybody might go into the forest, cut down in a most valuable portion all young trees over any extent of area he wished, kill the mature ones and make a great bonfire of the whole, sow in the ashes, reap a crop, and destroy another area next year; a man wanting covering leaves for cigarettes might cut down a tree without let or hindrance; a cattle-owner requiring more extensive pastures might fire and re-fire the forest till it became sufficiently open to yield a dense grass crop; cattle, even including goats, might graze and browse in the midst of forest re-production. All this had to be stopped.

As regards general protection, the laws, being new, had to be worked leniently. This has been done, and the progress reported from time to time is satisfactory. Where forests suffer, especially under excessive grazing, they do so more from rights granted and privileges permitted during the time of settlement than from subsequent breaches

of forest rules. The greatest benefit conferred lies in the stopping of the above-described method of cultivation, locally known as *kumri, jhum*, or *taungya*, in the Government forests of almost all provinces. This step affords in the Central Provinces alone protection to at least 5,000 square miles, which otherwise would have been rendered bare once in every 15 to 20 years. Protection from fire is still in its infancy, and in almost every province it is necessary to depend more on fire-tracing and fire-watching than on the help given by the Forest Law, which, though sufficiently stringent for reserves and even protected forests, is quite inadequate to protect them from fires spreading into them from adjacent private forests and grazing lands, and from open forests belonging to the Government. In all these areas fires intentionally lighted are still the order of the day, and they are permitted to spread wherever they find nourishment and wherever the wind may carry them. This, apart from the mere protection of the Government forests, is probably the most important question connected with forestry, and consequently with agriculture, in India. These annual fires are the main reason of the barren condition of most of the Indian hill ranges, and are closely connected with distress and famine. Many prejudices will have to be overcome in order to check this evil, and it will take the full power of Government to do so.

In the meantime practical steps have been taken to prevent the spread of external fires into the more valuable Government forests. During the last year 5,600 square miles were thus protected from fire, at a total cost of R1,08,437; and the following table gives a *résumé* of the work done since fire protection was first begun :—

Fire protection in the whole of India (under the Government of India).

Circle.	Total Number of Acres.				Total Cost.	Cost in Pies per Acre over Area.			Co-efficient of Failure.	Figure of Merit.
	Attempted.	Failed.	Protected.	Accepted.		Attempted.	Protected.	Accepted.		
					R					
1. Bengal . . .	3,971,489	400,645	3,570,844	3,178,358	83,866	4·054	4·509	5·066	0·10088	0·40897
2. N.-W. P. and Oudh, Central Circle . .	1,922,227	110,782	1,811,445	1,670,121	1,27,569	12·742	13·521	14·666	0·05763	0·73432
3. N.-W. P. and Oudh, Oudh Circle . .	1,604,920	115,723	1,489,197	1,278,279	71,001	8·494	9·154	10·664	0·07210	0·61242
4. N.-W. P. and Oudh, School Circle . .	997,140	22,204	974,936	947,625	60,610	11·675	11·936	12·280	0·02227	0·25989
5. Central Provinces .	8,521,979	632,235	7,889,744	6,973,560	1,79,491	4·044	4·368	4·942	0·07419	0·30002
6. British Burma, Pegu Circle . . .	635,041	34,695	600,346	544,240	1,14,871	34·730	36·737	40·525	0·05463	1·89730
7. " " Tenasserim Circle .	472,464	55,959	416,505	360,252	15,902	6·462	7·330	8·475	0·11823	0·76400
8. Assam . . .	1,008,478	205,023	803,455	570,364	61,521	11·713	14·701	20·710	0·20309	2·37879
6. Berar . . .	7,166,298	591,802	6,574,496	6,026,324	40,967	1·097	1·193	1·305	0·08258	0·09059
Total .	26,300,036	2,169,068	24,130,968	11,549,123	7,55,798	5·517	6·013	6·734	0·08247	0·45499

By fire protection, the regulation of grazing, and the general protection of the forests, ample re-production is, after a shorter or longer period, as a rule ensured in the more valuable forests of India, though in some of the drier regions, areas thoroughly desolated and with unfavourable soil will resist improvement for the time being.

Most Indian forests are of a mixed character, containing only one or a few valuable species which repay the working of the forest. Moreover, all age-classes are as a rule represented on the same area, and this necessitates almost invariably working by selection ("*jardinage*"). It is self-evident that these facts make the problem of forestry—to secure a continuous yield proportionate to the stock on the ground without causing the deterioration of the forest—extremely difficult. In previous times the work was carried on haphazard, or based sometimes on an exceedingly rough valuation of the growing stock only. As a rule, the demand and requirements for forest produce were, however, the only considerations by which the exploitation of forests was governed, and no attention was paid to their potential capabilities. Of late, however, more pretentious working-plans have been made, and several provinces have organised a division or staff for this work only. The working-plans made in the provinces under the Government of India are scrutinised and audited by the Inspector-General of Forests before they are passed by the Local Governments. The Governments of Bombay and Madras have not as yet organised a separate professional audit of working-plans. The working-plans take special notice of all measures necessary to encourage, and, what is infinitely more difficult in a mixed forest, to guide natural re-production, and they prescribe any artificial means, such as girdling of inferior trees, dibbling in of seed, &c., that are required to assist a natural re-production of the species or admixture desired; for the charges under the Indian Forest Department are by far too extensive, and markets at high rates are not sufficiently general and secure, to permit of the extensive use of arboriculture,—extensive, that is to say, if compared with the area under forest. That this subordinate branch of forestry has not, however, been neglected, is shown by the fact that over 80,000 acres of plantations are recorded as completely stocked.

The exploitation of timber, at least of the more valuable timber for Government forests, has gradually been resumed by the Forest Department, after a fair trial had been given to the scheme of working such produce by lessees. Of minor forest produce, the most important at present are grass, hirda fruit (*Terminalia Chebula*), bamboos, cutch, cardamom, catechu, and lac; but there are many others of lesser value.

The estimated yield in timber of all Government forests in the provinces under the Government of India was during 1884-85 as follows :—

	Tons.
By Government Agency	148,003
,, Purchasers and Permit-holders . . .	860,219
,, Free Grants	41,105
Total .	1,049,327

This does not always include the timber removed by right-holders.

The value of rights to minor forest produce is far in excess of the value of the timber granted under rights, but neither of them has ever been estimated as yet.

The financial results of Forest Administration in India have been as follow :—

Quinquennial periods.	Revenue.	Expenditure.	Surplus.
	R	R	R
1864-65 to 1868-69 annual average	37,38,189	23,81,732	13,56,457
1869-70 to 1873-74 ,, ,, .	56,25,693	39,89,632	16,36,061
1874-75 to 1878-79 ,, ,, .	66,55,913	45,76,372	20,79,541
1879-80 to 1883-84 ,, ,, .	87,84,514	56,07,652	31,76,862
1884-85	1,01,02,420	68,27,373	32,75,047

CHAPTER VIII.

AREA AND POPULATION.

THE last Census of the population of India was made in January 1881, and the facts and figures given in the following remarks are taken from the Census Report. A table is given below in which the area, total population, and density of population of the Indian Provinces and States are compared with those of some of the European countries. From this table it will be seen that while India is exceeded in area by Russia alone of European States, her population is about 3½ times that of Russia, while the population of the province containing the largest number of inhabitants exceeds that of every other European State. She has two provinces exceeding in population the Austrian Empire, France, or the United Kingdom, and three which have more inhabitants than Italy, or England and Wales. In respect of area, England would take the eleventh place, and in respect of population the third place, among Indian administrative units. In density of population, India, as a whole, is surpassed by Belgium, Saxony, the United Kingdom, Italy, the German Empire, and Austria, but her four most populous provinces are less crowded only than Belgium, England and Wales, and Saxony. A comparison of the table with the map of India at the commencement of this Atlas will show that the greatest density of population is to be found in the north, north-eastern, and southern parts of India, while the central tracts are more thinly populated.

Area in Square Miles.

Russian Empire	2,088,274	Hyderabad	81,807
INDIA	1,382,624	Central India	75,079
Austrian Empire	240,338	*England and Wales*	58,186
German Empire	210,493	*England*	50,823
France	204,031	Assam	46,341
Bombay	197,875	*Portugal*	34,507
Spain	195,716	*Ireland*	32,524
Bengal	193,198	*Scotland*	30,362
Punjab	142,449	Mysore	24,723
Madras	141,001	*Greece*	19,342
Turkey in Europe	136,627	Berar	17,711
Rajputana	129,750	*Switzerland*	15,477
Hungary	124,431	*Hanover*	14,548
United Kingdom	121,305	*Belgium*	11,379
Austria	115,907	Baroda	8,570
Italy	114,325	*Saxony*	6,777
Central Provinces	113,279	Travancore	6,730
North-Western Provinces and Oudh	111,236	Ajmir	2,711
		Coorg	1,583
Burma	87,220	Cochin	1,361

Density of Population per Square Mile.

Belgium	485	Punjab	159
England	484	*Austrian Empire*	157
England and Wales	446	*France*	155
Cochin	441	Berar	151
Saxony	438	*Hanover*	146
		Hungary	126
North-Western Provinces and Oudh	403	*Portugal*	126
Bengal	360	*Scotland*	123
Travancore	357	Central India	123
United Kingdom	287	Hyderabad	120
Baroda	255	Bombay	118
Italy	249	Coorg	113
Madras	221	Assam	105
German Empire	215	Central Provinces	102
Austria	191	*Spain*	85
India	184	*Greece*	85
Switzerland	178	Rajputana	79
Ajmir	170	*Turkey in Europe*	69
Mysore	169	Burma	43
Ireland	159	*Russian Empire*	36

Population.

INDIA	253,891,821	Hyderabad	9,845,594
Russian Empire	74,145,223	*Turkey in Europe*	9,400,000
Bengal	69,536,861	Central India	9,261,907
German Empire	45,234,061	*Belgium*	5,519,844
North-Western Provinces		*Ireland*	5,174,836
and Oudh	44,849,619	Assam	4,881,426
Austrian Empire	37,786,346	*Portugal*	4,348,551
France	37,672,048	Mysore	4,186,188
United Kingdom	34,884,848	Burma	3,736,771
Madras	31,170,631	*Scotland*	3,735,573
Italy	28,459,451	*Saxony*	2,972,805
England and Wales	25,974,439	*Switzerland*	2,846,102
England	24,613,926	Berar	2,672,673
Bombay	23,395,663	Travancore	2,401,158
Punjab	22,712,120	Baroda	2,185,005
Austria	22,144,244	*Hanover*	2,120,168
Spain	16,625,860	*Greece*	1,653,767
Hungary	15,642,102	Cochin	600,278
Central Provinces	11,548,511	Ajmir	460,722
Rajputana	10,268,392	Coorg	178,302

It is impossible to show in a map on the small scale suitable for an atlas the various races inhabiting India, but a separate map will be found among those exhibited by the Survey of India Department showing the distribution of the principal languages of India. The different Indian languages entered in the Census Returns amounted to 162, and though it is probable that in some cases mere dialectical varieties of speech have been shown as separate languages, the magnitude of the figure suffices to indicate the great number of nations inhabiting the country. Speaking generally, Upper India, exclusive of the frontier tracts, is inhabited by races speaking Aryan languages, while Dravidian tongues are spoken throughout the eastern, central, and southern portions of the peninsula. The Census Returns showed upwards of 93 millions of persons speaking Hindi or Hindustani, the latter being a language distinguished from the former by the free admixture of words of Arabic, Persian, and Turkish origin. One or other of these languages is spoken generally throughout the Punjab, North-Western Provinces and Oudh, Rajputana, Behar, and the greater part of the Central Provinces and Berar. Hindustani is the common language of Muhammadans, and is practically the *lingua franca* of India. Bengali is spoken by nearly 39 millions of persons in Bengal; Marathi is the language of a large portion of the Bombay Presidency, of Berar, and of Hyderabad, and is spoken in all by about 17 millions. The language of the Upper Punjab is Punjabi, spoken by about 14¼ millions. The remaining Aryan languages of importance are Gujarati, the language of about 9½ millions living chiefly in the northern part of the Bombay Presidency; Uriya spoken by nearly 7 millions in Orissa and the adjoining portions of Madras and the Central Provinces; Sindhi spoken by about 2 millions in Sindh; and Assamese, the language of about 1⅓ millions of the inhabitants of Upper Assam. The most important of the Dravidian languages are Telugu, spoken by about 17 millions in the north of Madras, the Nizam's dominions, Mysore, Bombay, and the Central Provinces; Tamil, the language of about 13 millions in the south of the Madras Presidency; Canarese, the language of the Carnatic Proper, spoken by about 8¼ millions in Mysore, and the adjoining portions of the Madras Presidency and Hyderabad; and Malayalam, spoken by about 4¾ millions near the Malabar Coast. Burmese, a language of Indo-Chinese type, is spoken by about 2½ millions in Burma.

Much pains was taken at the time of the Census to obtain an

accurate classification of the persons professing the different religions of India. Owing, however, to the extreme comprehensiveness of the term "Hindu," which is used to describe all the innumerable varieties of faith between the strict orthodoxy of the highest Brahmans and the degraded forms of worship practised by some of the aboriginal tribes, who, though worshipping members of the Hindu Pantheon, are scarcely Hindus in more than name, the results are necessarily somewhat uncertain. Of the total population, nearly 188 millions were returned as Hindus, a little over 50 millions as Muhammadans, about 6½ millions as following various forms of aboriginal faith, and about 3½ millions as Buddhists. Christians and Sikhs numbered about eighteen hundred thousand each, Jains about twelve hundred thousand, Parsees about eighty-five thousand, and Jews twelve thousand. Thus of every 1,000 inhabitants of India, about 740 are Hindus, about 197 are Muhammadans, some 25 follow one or other of the so-called aboriginal faiths, and about half that number are Buddhists. Christians and Sikhs constitute each about 7 per thousand of the community, Jews and Parsees do not number more than 5 and 3 respectively in every ten thousand. With the exception of Burma and part of the Punjab, Hindus constitute more than one half of the population of each province, while in Mysore, Madras, Coorg, Berar, and Hyderabad, their proportion to the total number of inhabitants is over 90 per cent. Muhammadans form more than one half of the population only in the British districts of the Punjab. They constitute nearly one third in the Lower Provinces of Bengal, being very numerous in the eastern districts. The form of religion practised in these districts is, however, debased, and, speaking generally, the Muhammadanism of Eastern Bengal differs very greatly from that of Upper India. The proportions in Assam and the North-Western Provinces are somewhat lower, and in Southern India, with the exception of the large Muhammadan State of Hyderabad, where, however, under 10 per cent. of the population profess the ruling faith, the number of Muslims is insignificant. The Buddhist population is almost confined to Burma, the adjacent parts of Bengal, and portions of the Northern Frontier. As might be expected, the Christians given in the returns are found in all parts of India. More than two thirds of them, however, belong to Madras, Travancore, and Cochin; missionary enterprise having made more progress in the extreme south of India than elsewhere.

CHAPTER IX.

EMIGRATION.

THE differences in the pressure of population on the soil in various parts of India are not, in the case of British India at least, checked to any important extent by voluntary emigration. A certain amount of migration does take place, but this is chiefly of a temporary character, and almost all emigrants who do not actually leave India return after a more or less lengthy period of absence to their own homes. At the Census of 1881 a classification of persons according to their birth-place was made, and from the statistics thus obtained the following table has been drawn up by the Compiler of the Moral and Material Progress Report to show the population of India born within each province :—

Population of India born within Province or State to which Enumeration by Birth-place extended, 1881.

—	Total born within Province or State.	Enumerated within Province or State.	Per Cent.	Enumerated outside Province or State.	Per Cent.
Ajmere	344,341	343,590	99·78	751	·22
Assam	4,641,754	4,600,716	99·12	41,038	·88
Bengal	69,370,834	68,746,084	99·10	624,750	·90
Behar	2,299,931	2,336,740	97·25	63,191	2·25
Bombay	23,301,523	22,713,582	97·48	587,941	2.52
British Burma	3,198,135	3,195,028	99 90	3,107	·10
Central Provinces	11,373,000	10,998,595	96·70	374,405	3·30
Coorg	104,790	103,437	98·71	1,353	1·29
Madras*	30,346,843	29,957,230	98·71	388,613	1·29
N. W. Provinces and Oudh	45,134,152	44,046,940	97·59	1,087,212	2·41
Punjab	22,136,312	21,933,752	99·09	202,560	·91
Baroda	1,884,377	1,881,405	99·84	2,972	·16
Central India	9,241,332	8,778,064	94·99	463,268	5·01
Hyderabad	10,026,970	9,623,067	95·97	403,903	4·03
Mysore	4,190,638	4,011,711	95·73	178,927	4·27
Rajputana	8,727,144	4,938,367	90·96	788,777	9·04
TOTAL	246,321,076	241,108,308	97·89	5,212,768	2·11

* Excluding the Native States of Cochin and Travancore.

Regarding the amount of emigration from one part of India to another, the Superintendent of Census Operations wrote: "Nearly 15 men in every 200 in Rajputana are emigrants to other States, 5 in 100 in Central India, and a somewhat lower figure in Mysore; then comes the Hyderabad State with 4 in every 100; there is then a drop in the Central Provinces, where we see 38 men in every 1,000 migrate to neighbouring countries. A larger drop again is from the Central Provinces to Bombay, where only 25 men in every 1,000 migrate to territories outside Bombay, and so on in reduced numbers till we get to Madras with only 25 men in every 2,000 and Bengal with 9 in 1,000. Burma shows the least migratory population—less than 1 in every 1,000; Baroda comes next with little over 1 in 1,000." The temporary character of the emigration which takes place is also shown clearly by the very small proportion of female to male foreigners in all provinces.

It is only from such data as the census affords that the extent of the internal movements of the people can for the most part be ascertained. There are, however, two cases in which migrations on a tolerably large scale from one part of India to another come directly under the cognizance of Government. The first of these is the migration of labourers, chiefly from Chutia Nagpur and the adjacent regions of Behar, to the tea-gardens of Assam. From the commencement of the tea industry down to the year 1863 this emigration was uncontrolled by law. In that year the first law regulating the transport of native labourers to Assam and Cachar was passed. For the next ten years all emigration was fully controlled, but in 1873 the restrictions previously imposed were somewhat relaxed, and under the present law (Act I of 1882) emigration may take place in any of four ways: (1) a labourer may go to the tea districts as a free immigrant and there take work on an ordinary contract outside the Act; (2) he may go on his own account and enter into a contract under the Act on arrival; (3) he may go under a contract entered into by him before a Magistrate with an agent of the garden in the district of recruitment; and (4) he may go under a similar contract made with a recruiter employed by a labour contractor. In either of the two last cases he travels to Assam under regulations made by the Government, and in all cases the Government provides for the sanitary inspection and regulation of all vessels carrying more than 20 passengers. Once on the tea-garden the Government secures to the labourer a fixed rate of wages not below 10*s*. a month for men, and 8*s*. a month for women, food at a fixed price mentioned in the contract, accommodation and medical attendance. In exchange for this the emigrant enters into a contract to labour for three or five years, and is rendered liable to criminal punishment for desertion. The so-called free emigration is gradually superseding emigration under contract. Including men, women, and children, the total number of immigrants on tea-gardens in Assam on the 1st July 1884 was 278,036, of whom 86,028 were adult labourers on contract, 99,307 adult labourers without a contract, and 92,701 were children.

From very early days emigration on a considerable scale has taken place from the mainland of the Madras Presidency to the adjacent Island of Ceylon and to Burma. In both these cases emigration is entirely free, and the knowledge which Government possesses of its progress is due to the returns kept under the Native Passenger Ships Act. From these returns it appears that in the year 1884, 5,993 persons embarked for Burma and 41,751 for Ceylon from ports in British India. A certain amount of emigration took place also from the French port of Karikal. An idea of the amount of emigration which takes place from the Madras Presidency to Burma may be gathered from the fact that at the time of the census, out of the total population of the latter province, no less than 74,430 persons were born in Madras. Emigration to Ceylon is of a more temporary nature and fluctuates considerably with the labour demand in the colony and the price of food in Southern India.

The Straits Settlements also receive a considerable amount of Indian labour. The export was formerly regulated by a special law, but this has now been repealed on the provision by the Colonial Government of satisfactory assurances for the well-being of Indian subjects in the colony and against their exportation from it to the adjacent native States. Recently steps have been taken, under certain guarantees, to place the States of Johore, Perak, Selangor, and Sungei Ujong, in which there is a British Resident, in the same position as regards Indian labour as the Straits Settlements.

India is also the chief source of the labour-supply of several of the British and French colonies. The following account of this emigration is taken from the Moral and Material Progress Report recently published by the India Office:—

"For more than forty years past there has been a steady flow of emigration from India beyond the seas, in the form of coolies, who are enlisted to work on plantations in tropical colonies. The first British colony to seek for labour in India was the Island of Mauritius, which began to import coolies in 1842. The total number of persons of Indian origin now in Mauritius is estimated at about 248,000, being 64 per cent. of the entire population. Demerara, or British Guiana, and the neighbouring Island of Trinidad, in the West Indies, both began to import coolies in 1845. The total number of persons of Indian origin now in Demerara is estimated at 88,000, or 35 per cent. of the entire population; and the number in Trinidad at 51,000, or 33 per cent. Jamaica also began to import coolies in 1845, but the emigration was never large, and has been frequently interrupted. The total number of persons of Indian origin now in Jamaica is estimated at only 11,000. Some of the smaller West India Islands, such as Grenada, St. Vincent, and St. Lucia in the Windward group, and St. Kitts and Nevis in the Leeward group, have from time to time imported a few coolies; but the aggregate number of persons of Indian origin now in all these smaller islands is estimated at only 5,000, or 3 per cent. of the entire population. Natal, on the South coast of Africa, began to import coolies in 1860, but the emigration has been large only since 1875. The total number is estimated at 25,000, being just equal to the European population, and contrasting with 312,000 native inhabitants. Fiji, the nearest British colony in the Pacific Ocean, imported 498 coolies in 1878-79 and 922 in 1882-83; total, 1,420.

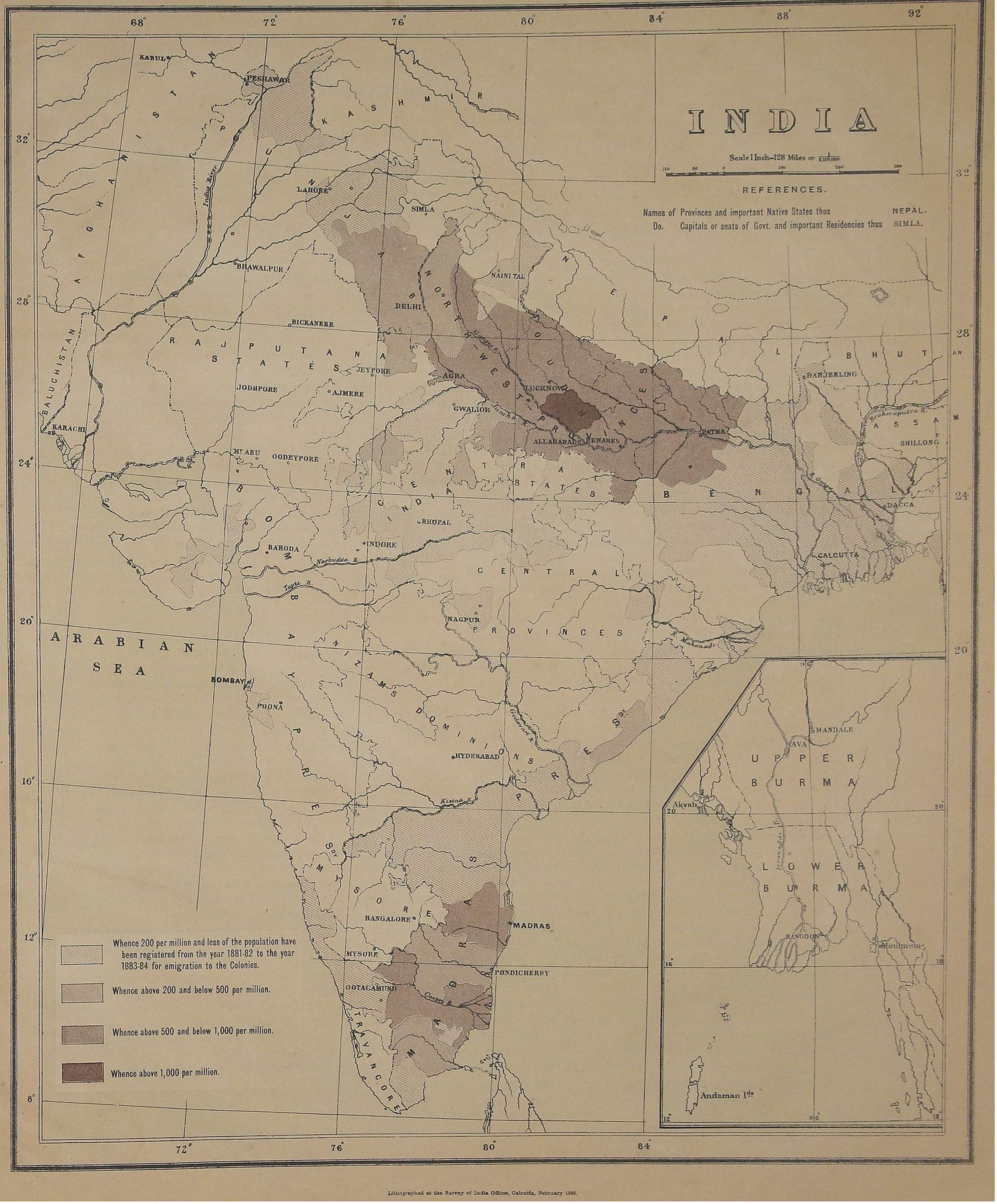
"Concerning the emigration to the French colonies, the information available is not of recent date. Réunion, the neighbour of Mauritius, began to import coolies in 1860. The emigration from British ports was suspended in 1865, but has continued regularly from French ports. The total number of persons of Indian origin in Réunion has been approximately estimated at 45,000. Cayenne, or French Guiana, received an importation of coolies from Calcutta in 1873-74; but the mortality among them was so high that the experiment has not been repeated. Emigration, however, continues from the French ports; and the total number of persons of Indian origin in Cayenne has been estimated at 4,300. The two French Islands of Guadeloupe and Martinique in the West Indies began to import coolies in 1873 and 1874; and the emigration has since continued pretty regularly both from Calcutta and from French ports. The total number of persons of Indian origin has been estimated at 13,500 in Guadeloupe and 10,000 in Martinique.

"Surinam, or Dutch Guiana, began to import Indian coolies in 1873; but the number since the first year has never been large, and the total now in Surinam is returned at only 4,156. The Danish Island of St. Croix in the West Indies received an importation of coolies in 1864, of whom 87 are reported to be now settled in the colony."

Each of the colonies importing labour from British India has its emigration agent at the port—Calcutta or Madras—from which emigration takes place. The emigrants are collected by recruiters working under the supervision of the agents, and are brought before a Magistrate or other registering officer appointed by the Government, before whom, after he has satisfied himself that they understand the conditions on which they emigrate, and that they are willing to accept them, they execute labour contracts. They are then brought down under rules prescribed by the Government to the port of embarkation, where they are lodged under the supervision of the agents in depôts until a vessel is ready for their accommodation. Every care is taken to prevent the emigration of persons unwilling to go, or physically unfit to labour. The map on the opposite page is designed to show the sources in India of the colonial labour-supply. The voyage to the colonies is conducted under stringent regulations for the care of the emigrants, who, on arrival, are governed by the colonial regulations, which are generally approved by the Secretary of State for India and by the Indian Government. In foreign colonies the treatment of Indian immigrants is governed by conventions entered into between the mother-country and Her Majesty's Government. A large number of emigrants return from the colonies every year, and of these some emigrate again after a short stay in India. During the year ending on the 31st March 1885, 4,648 persons returned to Calcutta, bringing with them as savings property to the value of over $9\frac{1}{2}$ lakhs of rupees. In addition to these, 730 persons returned to Madras from Mauritius, Natal, and Demerara, bringing with them 56,000 rupees; 2,744 persons also returned from the French colonies bringing with them in cash savings to the amount of R1,21,000, besides ornaments and jewellery.

Thus the emigration which takes place from India, though comparatively insignificant in its effect in relieving the overcrowded tracts of the country, is of advantage in enriching the cultivating classes and enabling them to spend more capital on their cultivation. It is true that a considerable quantity of waste land is available in India, but the absence of capital, save in exceptional cases like that of Assam, renders its cultivation a matter of difficulty and emigration to it unprofitable. In the colonies where a fertile soil and a generally well-distributed rainfall renders the opening up of fresh country remunerative, capital is forthcoming, and the difficulty to be met is want of labour. This difficulty India can, and to a great extent does, supply; and it is a matter of some importance that Indian labour should establish itself in the colonies before the competition of the Chinese labour-supply renders its establishment difficult, if not impossible.

EMIGRATION.



Lithographed at the Survey of India Offices, Calcutta, February 1886.

CHAPTER X.

FOREIGN TRADE.

THE foreign trade of India is mostly carried on by sea, but there is also a smaller trade carried across the land frontiers of the Empire into and from the neighbouring countries. The trade carried by sea and that carried by land will be treated separately in this chapter.

The foreign trade of India by sea in the last official year, ending on 31st March 1885, amounted in value to £154,817,192,* of which £69,591,270 represented the value of imports, both merchandise and treasure, while the exports, including re-exports, of merchandise and treasure, amounted to £85,225,922. This large excess of exports over imports is an unvarying feature in the trade statistics of India, explained by the fact that India is a debtor to England for capital lent, and has also to remit considerable sums to England yearly for the cost of Military and Civil Administration, for furlough pay and pension to officers on leave or retired from the service, and much of the savings of a great many of the Europeans, official and non-official, living in India. The excess of exports over imports for the last six years has averaged about £18,100,000 annually, while the drawings of the Secretary of State in Council bills for the same period have averaged £19,363,662 annually, which must be taken to be the cost to India of the interest on the debt she has accumulated, and of the other items mentioned above.

The trade has increased more than tenfold during the last fifty years, but the earlier returns were very imperfect, and it will be more accurate to say that the rate of present increase is between 4 and 5 per cent. annually—a very fair rate of increase when the generally slow progress of Asiatic countries is considered. Although the trade has steadily increased to the large sum mentioned above—a sum greatly in excess of the trade value of any other country except England, France, Germany, and the United States,—it must be allowed that relatively to the population the trade is very small. It represents a sum of no more than 12 shillings a head of the whole population, a figure which stands in striking contrast to 350 shillings a head in the United Kingdom, 168 shillings a head in France, 145 shillings in Germany, 105 shillings in the United States, and 68 shillings in Italy. These figures point to the extreme poverty of the mass of the Indian people, and it must not be forgotten that the wants and requirements of even well-to-do natives are fewer and simpler than even those of the poorer classes of a backward European country. Comparing Asiatics with Asiatics, which is a truer test, it appears that whereas the foreign trade of India represents a sum of 12 shillings a head of the population, that of China represents no more than three shillings.

More than half of the whole trade is carried on with the United Kingdom; the proportion last year having been more than 55 per cent., while about 25 per cent. represents interchange with other Eastern countries—China, the Straits, Ceylon, Mauritius, Arabia, Persia, Egypt, and others. The trade with France represents less than 6 per cent. of the whole, while the trade with other European countries is even more insignificant. No doubt some of the trade from and to the United Kingdom consists of articles brought from or intended for other European countries or America, but it cannot be traced, and the fact remains that the United Kingdom is India's largest customer, whether as a producer and consumer or as an agent for distribution. Most of the cotton yarn and piece goods, of the woollens and silks, the coal and the salt, the metals, machinery, and railway plant, which form the bulk of the import trade, comes from England.

It has been said above that an important feature in the trade statistics is the large normal excess of exports over imports. Another striking feature is the continued absorption of the precious metals. The flow of gold and silver into India is unintermittent. The total net imports of these metals—that is, deduction made of the quantities again exported—during the last six years amounted to £63½ milions, the proportion of gold to silver being as 3 to 5. The gold is all hoarded, and to a large extent converted into ornaments for the persons of the wives and children of the owners. It is in this form that the native of India still prefers to keep his savings secure from the rapacity which traditionary experience of former oppressive governments taught him to associate with the officials of the State—a conviction which has not even yet departed from him. The silver is mostly all coined into rupees at the mints, though it does not then all remain in currency, for the silversmith in India works up rupees very largely into ornaments.

Of the whole trade of India about three fourths is carried on with countries the route to and from which lies through the Suez Canal or round the Cape of Good Hope. The extent to which the Cape route has been abandoned in favour of the Canal since its opening will be apparent from the fact that of a possible trade of 75 per cent. more than 65 per cent. was actually conveyed through the Canal last year; and of this Indian trade through the Canal, amounting to a value of £101½ millions sterling, more than three fourths was trade to and from the United Kingdom, the value being nearly 77½ millions sterling. These figures attest the high importance of the Canal to the commercial interests of India and England. With the increasing use of the Suez Canal there has been an increasing substitution of steamers for sailing vessels in the Indian carrying trade. The whole number of vessels which entered Indian ports from foreign countries last year was 5,150, aggregating 3,291,000 tons. Of these 1,495 were steamers, aggregating 2,157,000 tons, so that the steam tonnage was two thirds of the whole. Of the 1,134,000 tons of sailing tonnage a very large proportion consists of small craft trading between India and China, the Eastern Archipelago, Arabia, Persia, and Zanzibar, Mauritius, and other places on the eastern coast of Africa. Sailing vessels play but an insignificant part now in the carrying trade between India and the Western world. More than 82 per cent. of the shipping employed in the Indian carrying trade is British and British-Indian.

The bulk of the foreign trade (about 95 per cent. of it) is concentrated in the five principal ports of the country, Bombay, Calcutta, Madras, Rangoon, and Karáchi, more than 80 per cent. flowing in and out of Bombay and Calcutta, the former being now the most important commercial centre in India. Rangoon and Karáchi are rising places, with a fine future in prospect, especially for Rangoon, which may become the main inlet and outlet for the trade of South-Western China.

* *Note.*—In this chapter, values in rupees are expressed in sterling at the conventional exchange of 10 rupees to the pound sterling.

As already remarked, the wants of the people of India are comparatively few and simple. The bulk of the imports consists of cotton piece goods and yarns, liquors, metals (chiefly copper, iron, and tin), hardware, machinery, railway material, woollen and silk goods, kerosine oil, coal, raw silk, sugar, salt, and spices. The industrial development of India has been slow except in two lines, the manufacture of jute and cotton. The cotton spinning and weaving industry is chiefly concentrated in the Bombay Presidency, though there are a few mills in other provinces also, while the jute manufacturing industry is confined to Calcutta and its neighbourhood. The cotton mills of India now employ 16,496 looms and 2,037,055 spindles, and the jute mills 6,926 looms and 131,740 spindles. The capital invested in cotton mills and jute mills, so far as they are worked on the joint-stock principle, is £8,221,725 for the former and £2,490,000 for the latter.

There can be no doubt that the cotton industry has had an appreciable effect on the import trade in cotton goods and yarns. The revolution which has been effected in this industry is interesting. In the last century India was full of hand-looms; cloths produced by cottage industry were worn by the whole population, the better qualities being also exported in considerable quantities to England. The creation of the English cotton industry in Lancashire was followed by a great restriction in the Indian cottage industry, and gradually India not only ceased to export cottons to England, but came to depend herself to a very large extent upon England for the supply of clothing to her own people. This again was followed by the creation of an export trade in raw cotton for the supply of the Lancashire mills—a trade which was enormously stimulated by the interruption in the supplies of American cotton during the War of Secession. Then also was seen the establishment of cotton mills in Western India, the outturn of which in the coarser yarns and cloths has prevented the increase of the import trade in English cottons, and is likely enough in the not very remote future to reduce that trade to comparative unimportance, and at the same time to quite extinguish the Indian hand-loom industry which still exists to some small extent in various places. On the other hand these mills, with the jute mills and the other few large industries that India possesses, have greatly augmented the imports from England of machinery, metals, and coal.

The re-export trade of India is comparatively very limited. It may be said that of the merchandise received from foreign countries yearly not more than about 5 per cent. is re-shipped abroad. There may be perhaps some 3 per cent. more sent across the land frontiers. And, broadly, quite 90 per cent. of the imports are consumed in India itself. The re-export trade is carried on mainly at Bombay, which is a convenient depôt between Europe and the coasts of Arabia, Persia, and Africa.

The exports of Indian produce and manufactures were valued last year at £80,313,208. While the largest part of the import trade consists of manufactured goods, about half of them being cotton cloths and yarns, the bulk of the export trade consists of food-stuffs and raw material for manufacture, the principal items being.

Food-stuffs: wheat, rice, tea, sugar, coffee, spices;

Raw material: cotton, jute, oilseeds (linseed, rape seed, til or sesame, poppy, and others), hides and skins, teakwood, wool;

Goods partly manufactured: Cotton yarn, indigo, vegetable oil (castor and cocoanut), saltpetre, raw silk, tanned hides and skins;

Goods fully manufactured: Cotton piece goods, grey and coloured, bags and sacks of jute, shell lac, silk piece goods;

Drugs and Narcotics: Opium.

The trade in some of these articles has sprung into large dimensions in the course of a few years. Thus the trade in wheat was created not more than twelve years ago, the main factors in its development being the cutting of the Suez Canal and the increase of railways in India, together with the decline in exchange. The export of tea has attained its present dimensions within the last twenty years, the suitability of the waste lands of Assam and Cachar for the cultivation of the tea plant having attracted European capital and suggested an almost unlimited opening for the employment of Europeans. The trade in cotton yarns and cloth is also the creation of the last twelve years, and the extensive manufacture of gunny bags is not older. The export of raw jute on a really large scale only dates from a period subsequent to the Crimean War. The export of oilseeds took large proportions about the same time as the trade in wheat came into existence, its development being favoured by the same causes. The trade in raw cotton was a result of the American War of Secession. On the other hand, while trades like these have risen from nothing and stand forth as the most important components of the Indian export trade, certain other industries which were of the first importance when the East India Company was a great trading corporation a century ago, have either remained without material increase or have fallen away into comparative insignificance,—such as, for instance, the trade in muslins, in silk goods, in raw silk, in indigo, and in saltpetre.

The figures in the tables appended shew at a glance the extent of the import and export trade in the principal articles of merchandise exchanged between India and other countries last year. A diagram giving somewhat similar information in a pictorial form will be found at the end of the chapter.*

Table I.—Imports.

Articles.		Quantity.	Value.
			£
Cotton piece-goods, grey	yds.	1,138,343,726	12,276,501
„ white	„	277,875,450	3,698,470
„ coloured	„	315,345,829	4,720,184
Cotton yarn	lb	44,799,637	3,360,420
Metals	tons	236,201	4,843,733
Machinery and Millwork		...	1,484,124
Railway material		...	1,592,620
Hardware and Cutlery		...	844,552
Coal and Coke	tons	708,560	1,204,341
Kerosine oil	gallons	26,299,091	1,110,051
Silk piece-goods	yds.	12,080,177	1,264,648
„ raw	lb	1,831,702	747,563
Woollen piece-goods	yds.	10,700,128	1,002,312
Liquors	gallons	2,310,976	1,217,921
Provisions		...	1,103,321
Apparel		...	942,232
Sugar	cwt.	1,616,874	2,140,838
Salt	tons.	412,839	649,233
All other articles		...	8,946,247
TOTAL VALUE		...	53,149,311

Table II.—Exports.

Articles.		Quantity.	Value.
			£
Cotton, raw	cwt.	5,066,057	13,286,367
„ yarn	lb	65,897,183	2,441,100
„ manufactures		...	896,928
Opium	cwt.	118,599	10,882,606
Oilseeds	tons	912,534	10,745,203
Rice	„	1,102,576	7,192,197
Wheat	„	791,537	6,309,140
Jute, raw	cwt.	8,368,686	4,661,368
„ bags	No.	82,779,207	1,410,322
Hides and skins	cwt.	1,010,578	4,934,340
Indigo	„	154,629	4,068,899
Tea	lb	64,162,055	4,044,759
Coffee	cwt.	328,317	1,245,506
Wool, raw	lb	18,928,173	713,576
All other articles		...	7,480,897
TOTAL VALUE		...	80,313,208

* The diagram showing consumption of tea is borrowed from the Circular, dated 27th January 1886, of Messrs. Gow, Wilson, and Stanton, tea brokers, London.

Table III.—Value of Trade (in merchandise) with principal countries.

Countries.	Imports therefrom.	Exports thereto.
	£	£
United Kingdom	42,197,870	32,944,581
China	1,865,759	12,471,893
France	604,246	8,168,508
Italy	418,111	3,485,144
Belgium	247,227	3,120,845
Austria	477,777	2,342,663
United States	1,138,068	3,453,278
Straits Settlements	1,709,596	3,165,666
Mauritius	1,663,627	709,302
Ceylon	410,368	1,783,448
Persia	643,220	318,947
Australia	465,374	773,400
Other Countries	1,308,068	7,575,533
Total	53,149,311	80,313,208

FRONTIER TRADE.

The trade which crosses the land frontiers of India is as yet of no special importance, the whole value of the imports and exports last year amounting to less than £12 millions. This trade has to contend with great difficulties. The routes in many places lead across the highest mountain chain in the world and are made impracticable by snow for more than half the year. In other places they are caravan tracks across barren deserts or paths cut through primeval forest and malarious jungle, and, whether they pass over desert or jungle, the trader is often subject not only to the risks and difficulties placed in his way by Nature, but to the attacks of freebooters and savages who regard the peaceful trader as lawful prey.

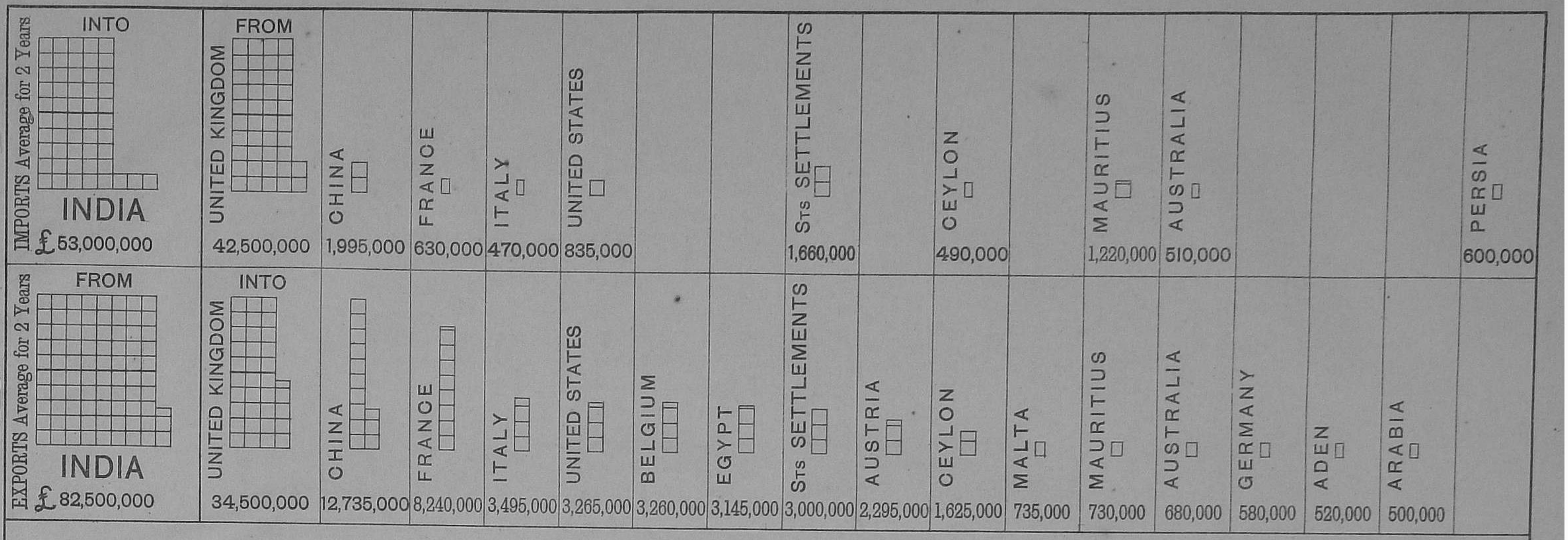
The land frontier stretches over an immense line from Karáchi in the extreme west to the most south-easterly point in British Burma, Mergui. Over this vast line of frontier the current of trade flows, very unequally in its various channels, between India and Baluchistan, Afghanistan, Kashmir, Tibet, Nepal, Sikkim, Bhutan, the Eastern Mountain Country (the home of the savage tribes known as Abors, Mishmis, Daphlas, Nagas, Lushais), Upper Burma, the Karen and Shan Country, and Siam. There are but few points in the line where trade is really safe or is in possession of routes which lend themselves to large future development. These are (1) the railway which is now pushing on towards Quetta, (2) the road through the Khyber leading into Northern Afghanistan (and here the safety of traders is ensured only by blackmailing the clansmen of the pass), (3) the roads into Kashmir and (4) into Nepal, especially from Bengal, and (5) the great Irawadi route which leads into Upper Burma and South-Western China. Even on these routes the development of trade is much retarded by the sudden cessation of good roads at the British frontier and by the exactions to which traders are subjected by the States beyond the border. Thus the trade with Afghanistan would make rapid progress if it were not impeded by Russian fiscal policy which shuts out Indian goods from the Central Asian markets, and by the heavy dues levied by the Amir of Afghanistan. The strict commercial restrictions imposed by the Nepalese durbar and by the Chinese officials in Tibet hamper trade with those countries, and the active intervention of the British Government in Kashmir and Upper Burma has only now succeeded in removing impediments which were paralysing to trade. It is possible that the arrangement just concluded with China for a British mission from India to Tibet may have some effect in increasing trade with that country. Still, considering the natural difficulties of the trade routes, the great distances to be traversed, the cost of transport, and the general poverty of the inhabitants of the regions beyond the Indian frontiers, it would be sanguine to anticipate such a development of trade as would make its value reach real importance.

The bulk of the trade consisted in 1884-85 of exports from India of cotton goods, metal-ware, tea (to Kabul and Kashmir), rice (to Upper Burma) railway material (for the Sind-Peshin line), indigo, and some cattle. The imports were largely food-grains, timber (from Kashmir and Burma), horses, fruits, and drugs. It is impossible to obtain anything like a correct account of the interchange of gold and silver.

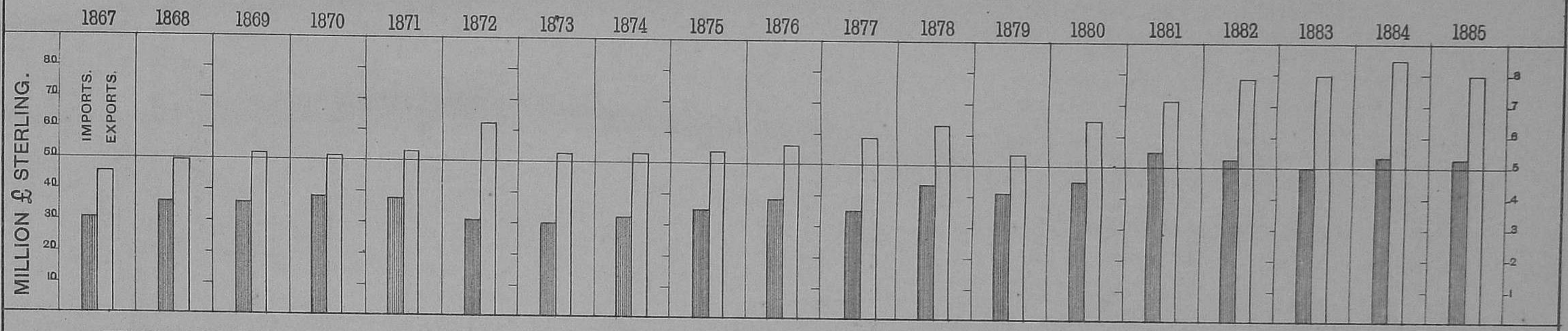
The table appended shews the value of the trade in 1884-85 with the principal countries on the other side of the Indian frontiers :—

	Imports into British India.	Exports from British India.
	£	£
Southern Afghanistan and Baluchistan	349,802	1,781,832
Kabul	241,345	469,103
Kashmir	545,913	384,999
Tibet	74,097	30,806
Nepal	1,416,387	986,291
Upper Burma	2,023,933	2,071,424
Karennee	462,825	133,864
N. & S. Shan States	39,738	34,856
Siam	40,864	122,554
Other Countries	319,658	106,620
Total	5,514,562	6,122,349

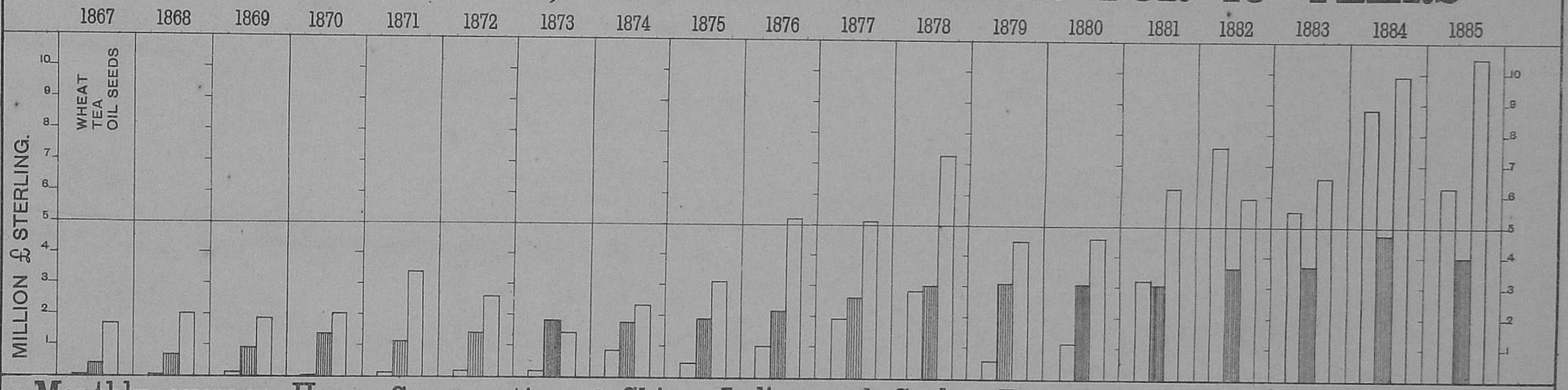
TRADE OF INDIA WITH THE WORLD



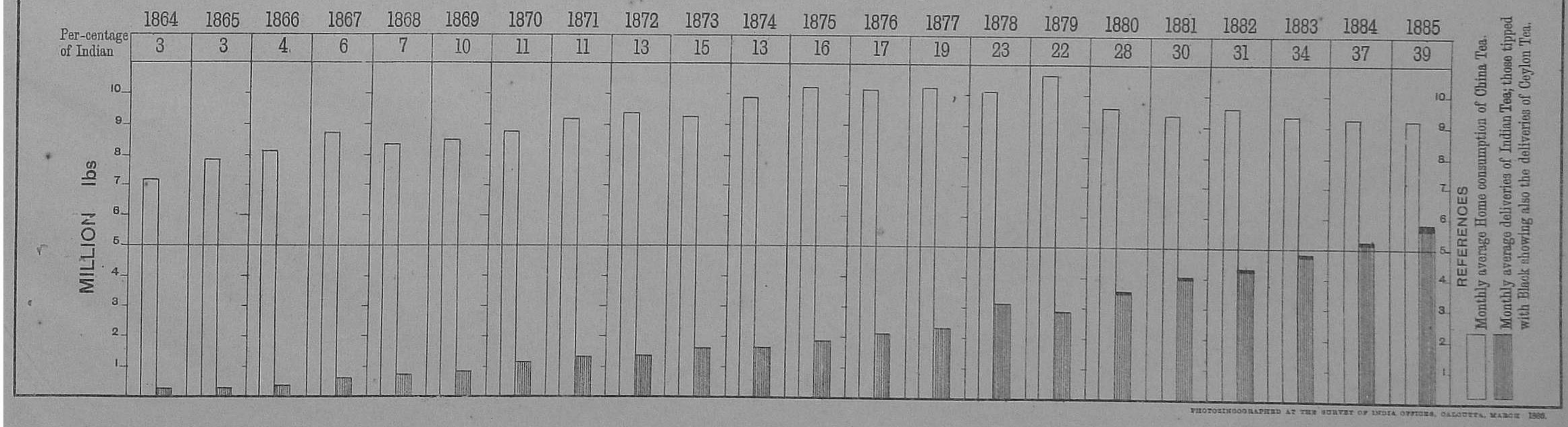
TOTAL IMPORTS AND EXPORTS FOR 19 YEARS



TRADE IN WHEAT, TEA AND OIL SEEDS FOR 19 YEARS



Monthly average Home Consumption of China, Indian and Ceylon Teas in each of the last 22 Years, together with the percentage of Indian and Ceylon consumed in each Year.



PHOTOZINCOGRAPHED AT THE SURVEY OF INDIA OFFICES, CALCUTTA, MARCH 1888.

CHAPTER XI.

FINANCE AND TAXATION.*

THE MUTINY left India with an embarrassed exchequer and a debt of 98 millions. When in 1860 the new Finance Minister reviewed the position, he found in it good grounds, not only for regarding it as seriously embarrassing, but for condemning, as unsound, the system from which it had resulted. He showed that the 46 preceding years had been a period of almost chronic financial embarrassment, that the deficits in 33 of those years had aggregated over 72 millions sterling, while the surpluses of the other 13 years had amounted to less than 9 millions, and that during the 59 years of the century considerable additions to the national indebtedness had been made in 44 years, while reductions had been effected in only 15. The Mutiny had intensified the normal tendency to deficit. It had added 40 millions to the national debt: despite all efforts to curtail it, the expenditure of 1860 increased the deficiency by another 4 millions. A stringent remedy was applied in the form of an income tax of $4\frac{3}{4}$*d.* in the pound on incomes between £20 and £50, and $9\frac{1}{2}$*d.* on all larger incomes. The customs duties were, at the same time, fixed at high rates which, as soon as the hour of panic had passed, were discovered to be working their natural result in impeding trade. Reductions were made, and the tariff has gradually been set free. Of the Indian customs there remained in 1884 only $1\frac{1}{2}$ millions duty on land-borne salt, 2 millions import duty on sea-borne salt, £410,000 on imported arms and liquors, and half a million on exported rice. The income tax expired in 1865. It was found necessary, however, in 1867 to replace it by a license tax on trades and professions, which was again replaced by an income tax in 1868. This, after undergoing several modifications, was allowed to expire in 1873; but in 1877 the policy of providing a margin of income against famine was adopted; and the margin was provided by a license tax. In 1886, the expenditure on the arrangements for the better military defence of the Empire combined with a heavy fall in exchange, has necessitated the re-imposition of an income tax, leviable on non-agricultural incomes.

Indian Finance since 1860.—The cessation of military operations, a series of excellent seasons, and the general expansion of trade which followed the restoration of public order, combined with fiscal reforms to re-establish the finances of the country. For several succeeding years the Imperial balance sheet exhibited either an equilibrium or a substantial surplus. In 1865 there was a surplus of $2\frac{3}{4}$ millions, but the three following years showed deficits aggregating more than six millions—a result which was attributed partly to the temporary stagnation of trade in connection with the European crisis of 1866 and a succession of bad harvests in India, and a fall in the price of opium, and partly to the increasing demands of an administration which was yearly becoming more conscious of its responsibilities, wider in its aims, more efficient, and, consequently, more costly. Hardly anything had been, or indeed could be, attempted in former times either to develope the resources of the country by adequate communications, or to protect it by irrigation from the famines consequent upon the droughts which periodically afflict one or another of its provinces. It now began to be realised that both results were within the range of possibility, and consequently must be numbered among the State's obligations to its subjects. The annual expenditure on roads, jails, barracks, hospitals, schools, and other matters of a like nature, known in the Indian Accounts as "Ordinary Public Works," had risen from 4 millions per annum to 6 or 7 millions, nor was it possible to restrict its growth. It became obvious that, satisfactory as was the growth of the national revenue, the imperative calls upon it were increasing at a still faster rate, and could be met only by a change of system. This conviction bore fruit in a measure which is one of the leading characteristics of the Indian financial system as it at present stands, the great engineering project known as the "Productive Public Works." The scheme took its rise in a proposal, made by Colonel (now General) R. Strachey in 1865, to lay out 20 millions on canals within the ensuing 10 years, to borrow this amount as it was required, defraying its interest from revenue until such time as the earnings of each project were sufficient to meet not only its working and maintenance expenses, but the interest on the cost of its construction. The scheme was elaborated and extended to railway construction in 1873, and in 1875 a regular forecast was made, providing for an annual loan of 4 millions, to be spent on railways and canals, and an annual charge for maintenance and interest which, it was calculated, would gradually decline and ultimately disappear. The undertaking received a check in 1876, when the continued fall in silver made it necessary for the Government to exercise greater caution than heretofore in its borrowings; and it was resolved to limit the annual loan for these projects, as far as possible, to the amount which might be advantageously borrowed in India, estimated at that time at about 2 or $2\frac{1}{2}$ millions; but expenditure has been steadily maintained, and the capital outlay which the Government treats as debitable to Productive Public Works, for the construction of new works or the purchase of completed projects, amounted at the close of 1884 to 74 millions. Working side by side with this system was another, under which the Government guaranteed 5 per cent. to various railway companies, sharing any profits earned in excess of this rate, having a claim to be repaid all advances of interest, and reserving an ultimate right of purchase. Nearly 100 millions have been thus raised. The guaranteed interest was, in the early days of the railways, far in excess of their net earnings, and the sums paid by the State on this account have amounted to 25 millions. On the other hand, the Government has now become the owner, by its right of purchase, of three most valuable lines, and will, doubtless, eventually acquire the whole railway system, and derive from it an important revenue. Apart from the question of Exchange, the combined result of the two systems in 1884 was a net profit to the State, after defrayal of the interest on capital outlay and other charges, of three quarters of a million.

Another reform, which has given the Indian Finances their present form, is the system of Decentralization. It was initiated by Lord

* In this Chapter the year referred to is the official year, beginning on April 1st,—*e.g.*, 1883 means April 1st, 1883, to March 31st, 1884. The pound referred to is the conventional pound of 10 rupees,—*e.g.*, £5,000,000 means 50 millions of rupees. The difference between the conventional value thus given to the rupee and its real value in London is described as the "Loss by Exchange." Fractions of a million, less than a quarter, are generally omitted, and the sum is denoted, in each case, by the $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ of a million nearest to it,—*e.g.*, £5,200,000 would be described as $5\frac{1}{4}$ millions. The accounts referred to are, generally, those shown in the "Finance and Revenue Accounts of the Government of India for 1884-85."

Mayo's Government in 1870. It aimed at checking unprofitable expenditure by Local Governments and encouraging economy by giving each of them an interest in the prudent management of their own finances. Up to this time the whole control of expenditure and the whole responsibility for the ultimate results had rested with the Supreme Government, and the Local Administrations, having no interest in economy, and a very direct interest in local improvement, naturally showed more anxiety to obtain as large a share as possible of the public income than to adjust their expenditure to the general financial resources of the Empire. The financial control of several great departments,—Jails, Police, Education, and others,—involving an expenditure of 4½ millions, was, accordingly, "provincialised." Allotments of funds were made to the several Provincial Governments, and they became responsible for the expenditure involved, entitled to any benefit arising from economical management or developed resources, and bound to make good any shortcoming by local taxation or by curtailment of expenditure in some other direction. The sum thus allotted was subsequently increased, by the development of the system, to 5½ millions. In 1877 there was a further development, and the system was extended to all the remaining branches of the administration, including Railways and Canals, with the exception of a few which are directly administered by the Supreme Government, or in which the Local Government could, manifestly, exercise no influence. The revenues from Stamps, Excise, Law, Justice, and the License Tax were at the same time handed over to the Local Government.

In 1879 the land revenue and forests in Burma were provincialised. In 1881 and 1882 there was a still further extension of the system. Heretofore the Local Governments had been allotted a fixed sum, wherewith to make good any excess of provincialised expenditure over provincialised receipts. Under the system now adopted a certain portion of the land revenue of each province, hitherto reserved as Imperial, was assigned for this purpose, the general result being that about three fifths of the revenue, or 42 millions, and about one fourth of the expenditure, or 19 millions, were to a greater or less degree provincialised, the Local Governments' share varying from the whole in some cases to a half or less fraction in others. The Local Governments have thus acquired a direct interest not only in provincialised revenue, but in the most important item of Imperial revenue raised within their own provinces. The provincial contracts by which these arrangements are carried out are renewed at intervals of five years, and the terms of each are adjusted with reference to the resources of the province and its probable development. There will be such a renewal at the close of 1886. Each of the Local Governments banks with the Government, and is bound to maintain a prescribed balance. The aggregate of these balances amounted in 1884 to one million.

Revenue.—The annual revenues of the Government are derived from various other sources besides taxation. The Government of India, in addition to its duties in defending, ruling, and administering the country, is a landlord, a manufacturer, a carrier, a speculator in engineering projects, an insurer of annuitants, a banker, a money-lender. The proportion which it receives in each of these capacities as well as from taxation may be seen in the following statement of Revenue and Expenditure for 1884.

Statement of the Revenue and Expenditure of the Indian Government for 1884.

[In millions of £ and decimals of millions.]

REVENUE.	£	£
Principal Heads of Revenue—		
Land Revenue	21·8	...
Opium	8·8	...
Salt	6·5	...
Stamps	3·6	...
Excise	4·0	...
Provincial Rates	2·5	...
Customs	1·	...
Forests	1·	...
Tributes	·7	...
License Tax	·5	...
Registration	·3	...
		51·
Post Office, Telegraph, and Mint	...	1·8
Receipts by Civil Departments	...	1·3
Viz, Courts, Jails, Police, Education, Marine, &c.		
Interest, Contributions to Pension, &c.	...	1·3
Revenue of Productive Public Works	...	13·1
State Railways 8·1, Net earnings of Guaranteed Railways 3·5, Canals ·1, Land Revenue due to Canals ·5.		
Revenue from Ordinary Public Works	...	1·
State Railways ·4, Canals ·1, Civil Buildings ·5.		
Receipts by Military Department	...	·8
		70·6

EXPENDITURE.	£	£
Direct demands on Revenue—		
Collection of Land Revenue	3·3	...
Opium	3·	...
Salt	·4	...
Assignments to Native States, &c., for Salt duties, &c.	1·3	...
Customs, Excise, Provincial Rates, &c.	·4	...
Forests	·7	...
Refunds	·2	...
Registration	·2	...
		9·5
Post Office, Telegraph, and Mint	...	2·
Salaries and Expenses of Civil Departments	...	11·6
Viz., General Administration, Salaries, &c., 1·6, Law and Justice, Jails, &c., 3·3, Police 2·8, Education 1·2, Ecclesiastical ·1, Medical ·7, Political ·8, Scientific and other Departments ·4.		
Pensions, Furlough, &c.	...	3·8
Interest on Debt	...	4·3
Exclusive of that incurred for Productive Public Works.		
Revenue Expenditure on Productive Public Works	...	12·3
State Railways 4·, Canals ·6, Interest and Payments to Guaranteed Companies 6·5, Annuities for purchase of Companies 1·2		
Expenditure on Ordinary Public Works	...	6·4
Army	...	16·
Loss by Exchange	...	3·2
Famine Relief and Insurance	...	1·5
Viz., Protective Railways ·9, Protective Irrigation ·3, Reduction of Debt ·3.		
		71·
DEDUCT Net amount of Provincial expenditure defrayed from Provincial balances	...	·3
		70·7

NET RESULT.

Revenue	£70·6
Expenditure	£70·7
Excess Expenditure	£ ·1

From the foregoing it will be seen that in 1884 the receipts and expenditure of the Government were in equilibrium, the receipts amounting to £70,600,000 and the expenditure to £70,700,000. Of the $70\frac{1}{2}$ millions of revenue, Government, in its capacity of landlord, received $21\frac{3}{4}$ millions by way of rental from the occupants of the soil, and 1 million from forests; it received $8\frac{3}{4}$ millions partly as a manufacturer and vendor of opium, and partly from an export duty on opium grown in Native States. From its various engineering projects it received $14\frac{1}{2}$ millions,—*viz.*, 13 millions from Canals and Railways under the Productive Works Scheme, and 1 million from other Public Works; as a carrier of letters and messages it earned $1\frac{1}{2}$ millions. Tributes from Native States amounted to $\frac{3}{4}$ million, payments made towards future pensions to $\frac{1}{4}$ of a million. Interest on various loans to £700,000. Altogether the gross sums received by the Government, otherwise than from taxation in the strict sense of the word, amounted to about 50 millions.

These gross receipts involve, of course, corresponding outgoings. The principal of these in 1884 were $3\frac{1}{2}$ millions on the collection of land revenue, $12\frac{1}{3}$ millions spent in the maintenance and working expenses of canals and railways, and in defraying the interest of the capital spent in their construction, 2 millions on Post Office and Telegraph, 3 millions in the purchase and manufacture of opium, and £700,000 on forests.

From taxation proper the Government received in 1884 about 20 millions, of which the principal heads were Salt $6\frac{1}{2}$ millions, Stamps and Court Fees $3\frac{1}{2}$, Excise 4, Provincial Rates $2\frac{1}{2}$, Customs 1, License Tax $\frac{1}{2}$ million.

The amount realised from eight of the principal sources of revenue in 1884, the proportion of them contributed by each province, their incidence per 1,000 square miles and per 1,000 of the population, in each province and in the whole of India, are shown below. The Land Revenue shown in column 1 includes the Land Revenue, £466,000, due to Productive Public Works, and shown under that heading in the foregoing statement.

Comparative Statement of Principal Sources of Revenue for the year 1884.

	Land Revenue. 1.	Salt. 2.	Stamps. 3.	Excise. 4.	Provincial Rates. 5.	Customs. 6.	Assessed Taxes. 7.	Forest. 8.	TOTAL.	Refunds and Assignments.	Net Amount.	Area.	Population.	Net Revenue per 1,000 Square Miles.	Net Revenue per 1,000 of Population.
	£	£	£	£	£	£	£	£	£	£	£	*Sq. Miles*	*No.*	£	£
British Burma	1,141,231	26,442	97,981	224,170	84,046	436,551	...	167,098	2,177,519	18,894	2,158,625	88,364	3,707,646	24,429	582
India, General	98,109	...	39,543	56,970	7,385	...	26	13,468	215,501	484,155	(*a*)–*268,654*	...	...	...	...
Central Provinces	606,309	...	136,988	249,293	64,822	...	23,907	102,720	1,184,039	47,774	1,136,265	84,048	11,505,149	13,519	98
Assam	404,943	...	77,256	221,039	42,650	...	...	18,042	763,930	7,449	756,481	41,798	4,815,157	18,098	157
Bengal	3,742,025	...	1,299,121	1,005,222	766,940	...	149,648	57,115	7,020,071	171,983	6,848,088	189,034	68,829,920	36,227	99
North-Western Provinces and Oudh.	5,814,861	...	605,882	524,361	654,942	...	121,491	157,232	7,878,769	458,101	7,420,668	105,471	44,107,061	70,357	168
Punjab	2,103,397	...	338,519	136,170	336,032	...	47,898	74,935	3,036,951	170,050	2,866,901	107,010	18,786,107	26,791	153
Madras	4,482,607	...	564,903	773,263	613,474	...	43,276	116,692	6,594,115	560,959	6,033,156	138,318	30,839,181	43,618	196
Bombay	3,904,546	...	446,429	821,379	221,270	...	125,582	277,484	5,796,690	1,213,112	4,583,578	124,457	16,383,422	36,829	280
	22,298,028	26,442	3,606,622	4,011,867	2,791,461	436,551	511,828	984,786	34,667,585	3,132,477	31,535,108	878,500	198,973,643	35,896	158
Salt	...	6,480,794	...	...	...	...	...	...	6,480,794	29,932	6,450,862	...	...	...	...
Customs	...	...	...	...	...	593,392	...	...	593,392	14,858	578,534	...	...	...	...
TOTAL	22,298,028	6,507,236	3,606,622	4,011,867	2,791,461	1,029,943	511,828	984,786	41,741,771	3,177,267	38,564,504	878,500	198,973,643	43,898	194
Revenue per 1,000 Square Miles.	25,631	7,480	4,146	4,612	3,209	1,184	588	1,132	47,982	...	43,898	...	...	...	...
Revenue per 1,000 of Population.	112·1	32·7	18·1	20·2	14·	5·2	2·6	4·9	209·8	...	193·8	...	...	...	...

This table shows the general incidence of these imposts to be £43,898 per 1,000 square miles, and £194 per 1,000 of population, or 3*s.* 10·56*d.* per head. Deducting land revenue, as being a rental, and forest revenue, which can in no sense be regarded as taxation, the incidence of the rest is £17,395 per 1,000 square miles, and £76 per 1,000 of population, or 1*s.* 6·24*d.* per head. The only compulsory tax of universal incidence is Salt, which falls at the rate of £32·7 per 1,000 of population, or 7·8*d.* per head.

Expenditure.—The national indebtedness, apart from that portion of it which has been incurred for Productive Public Works and the interest of which is paid by those undertakings, involves an annual payment, by way of interest, of $4\frac{1}{2}$ millions.

The total debt of India in England and India was, at the close of 1884, £$162\frac{1}{2}$ millions; the interest payable upon it was $6\frac{3}{4}$ millions. Of this, 2·4 millions represents interest on 74 millions borrowed for Productive Public Works, 4·3 millions the interest on ordinary Loan. It has been shown above that the net earnings of the Productive Public Works cover the whole of the interest upon their debt and leave a considerable margin of profit—in 1884 more than half a million—to the State. This portion of the public debt may accordingly be regarded as a source of income. The interest on it is shown under "Productive Public Works." The cost of general Administration is $1\frac{1}{2}$ millions. Under this come the salaries of the Viceroy and his Council, the Secretariat, and other Departments, and of the Secretary of State, and his Council and establishment. Courts of Justice and Jails cost $3\frac{1}{4}$ millions, the civil maintenance of order by the Police $2\frac{3}{4}$ millions, the military defence of the country 16 millions. The introduction of the productive works scheme did not relieve the Government from the necessity of outlay on the construction and maintenance of public works, such as roads, bridges, barracks, jails, courts, and the like, from which no direct return could be expected, but which were nevertheless essential to the well-being of the country. On these the Government has annually laid out sums which for the last ten years have ranged between 5 and 7 millions. In 1884 the outlay was $6\frac{1}{2}$ millions.

Besides these sums the Government pays annually more than two millions in various forms of pension or annuity, much of which has been earned by previous payments by the annuitants, $\frac{1}{4}$ million in furlough allowances, $\frac{3}{4}$ million in political pensions. Under the heading "Famine Relief and Insurance," it spends a sum of $1\frac{1}{2}$ millions per annum either in direct relief of famine distress or in reducing debt, or in the construction of canals and railways, the effect of which will be to prevent loss of life and property, and to reduce the cost of famine expenditure in any future famine. This arrangement is based on the assumption that the average cost of famines to the State, spread over a series of years, is $1\frac{1}{2}$ millions per annum, and that, therefore, the Government is not really paying its way unless it provides this margin in non-famine years, and to this extent improves its financial position either by the reduction of debt or by the construction of works directly designed for the reduction of the cost of future famine relief. There is, lastly, the loss by exchange computed on a comparison of the number of rupees which the Government has to pay at existing rates in discharge of its gold obligations with the number it would have to pay if a sovereign was worth only 10 rupees. This difference amounted in 1884 to $3\frac{1}{4}$ millions; but for special circumstances which enabled the Secretary of State to curtail his drawings on India by $2\frac{3}{4}$ millions, it would have amounted to 4 millions. The sum must, in order to get a perfectly correct view of the Indian accounts, be distributed over interest on ordinary Debt, Productive Public Works Debt, Military Expenditure, the India Office, Pensions, and the other heads involving remittances to England. This distribution will be shown in the accounts of 1886.

Revenue and Expenditure since 1871.—The following statement shows the Revenue and Expenditure of the Government for each year since 1871 :—

[*In millions of £ and decimals of millions.*]

	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
Total Revenue . .	56·3	56·3	56·4	58·0	58·9	58·5	61·8	65·	68·3	73·6	75·1	70·1	71·7	70·6
Total Expenditure charged against Revenue .	53·2	54·5	58·2	57·6	57·2	60·7	65·4	63	69·5	77·6	72·5	69·4	70·2	70·7
(+) Surplus or (−) Deficit	+3·1	+1·7	−1·8	+·3	+1·6	−2·1	−3·5	+2	−1·2	−4	+2·5	+·7	+1·5	−·1
Loss by Exchange . .	·4	·7	·8	·7	1·3	2·0	1·5	3·2	2·9	2·7	3·5	3·	3·8	3·2
Expenditure on Famine Relief or Insurance .	...	...	3·8	2·2	·6	2·1	5·3	·3	·1	·3	1·5	1·5	1·5	1·5
Expenditure on War .	...	...	...	...	...	...	...	...	4·8	11·3	1·6	1·2	...	·1

The years of deficit are those of the Behar Famine, 1873; the Madras Famine of 1876 and 1877; and the Afghan War, 1879 and 1880. It will be seen that but for the latter event there would have been a surplus in the one year of 3½ millions and in the other of 7 millions. The large reduction in revenue shown in 1882 arose from the remission of 3 millions of taxation in that year,—*viz.*, Customs 1¼, Salt 1½, Cesses ¼,—but for which the final surplus would have been higher by 9 millions.

The result of the figures is that the 14 years give surpluses aggregating 13½ millions, and deficits aggregating 9·1 millions, yielding a net surplus of 4·1 millions,—20 millions having, in the period, been spent in war, 14 millions in the relief of famine, and 6 millions in discharge of debt or the construction of works protective against famine, and the aggregate loss by exchange having amounted to 30 millions. In 1885 the Government resolved to incur large expenditure in strengthening the military defences of the country; and this, combined with a further heavy fall in exchange, has disturbed the existing equilibrium, and necessitated the imposition of an income tax.

CHAPTER XII.

PUBLIC INSTRUCTION.

PUBLIC INSTRUCTION in India is directly organised by the State, and is assisted by grants-in-aid, under State inspection. But at no period of its history has India been without some system of popular education, independent of State organisation or aid. The origin of the *Deva Nágari* alphabet is lost in antiquity, although it is generally admitted to be not of indigenous invention. Inscriptions on stone and copper, the palm-leaf records of the temples, and in later days the widespread manufacture of paper, alike indicate, not only the general knowledge, but also the common use, of the art of writing. From the earliest times the Brahman caste preserved, first by oral tradition, then in manuscript, a literature unrivalled in its antiquity and in the intellectual subtlety of its contents. The Muhammadan invaders introduced the profession of the historian, and their historical writers attained a high degree of excellence, as compared with European authors of the same mediæval period. Throughout every change of dynasty, vernacular instruction has always been given, at least to the children of respectable classes, in each large village. On the one hand, the *tols* or seminaries for teaching Sanskrit philosophy at Benares and Nadiya recall the schools of Athens and Alexandria; on the other hand, the importance attached to instruction in accounts reminds us of the picture which Horace has left of a Roman education. At the present day, a knowledge of reading and writing, as taught by Buddhist monks, is as widely diffused throughout Burma as in many countries of Europe. Our own efforts to stimulate education have been most successful, when based upon the existing indigenous institutions.

First English efforts at education.—During the early period of the East India Company's rule, the promotion of education was not recognised as a duty of Government. Even in England, at that time, education was entirely left to private, and mainly to clerical, enterprise. A State system of instruction for the whole people is an idea of the latter half of the present century. But the enlightened mind of Warren Hastings anticipated his age by founding the Calcutta Madrasa for Muhammadan teaching (1781), and by extending his patronage alike to Hindu *pandits* and to European students. Lord Wellesley's schemes of imperial dominion led to the establishment of the college of Fort William for English officials, in the first years of the present century. Of the Calcutta seminaries, the Sanskrit College was founded in 1824, when Lord Amherst was Governor-General; the Medical College, by Lord William Bentinck in 1835; the Hugli Madrasa, by a wealthy native gentleman in 1836. The Sanskrit College at Benares had been established in 1791, the Agra College in 1823.

Mission schools.—Meanwhile, the Christian missionaries made the field of vernacular education their own. Although discouraged by the authorities, and under the Company liable to deportation, they not only devoted themselves to their special work of evangelisation, but they were also the first Europeans to study the vernacular dialects spoken by the people. Nearly two centuries ago, the Jesuits at Madura, in the extreme south, had so mastered Tamil as to leave works in that language which are still acknowledged as classical by native authors. About 1810, the Baptist Mission at Serampur, on the Hugli River, sixteen miles above Calcutta, raised Bengali to the rank of a literary prose dialect. The interest of the missionaries in education, which has never ceased to the present day, although now comparatively overshadowed by Government activity, had two distinct aspects. They studied the vernacular, in order to preach to the people, and to translate the Bible; they also taught English, as the channel of Western knowledge.

State system of education.—After long and acrimonious controversy between the advocates of English and of vernacular teaching, the present system was based, in 1854, upon a comprehensive despatch sent out by Sir C. Wood (afterwards Lord Halifax). In the midst of the tumult of the Mutiny, the three Indian universities were calmly founded at Calcutta, Madras, and Bombay in 1857.* Schools for teaching English were by degrees established in every district; grants-in-aid were extended to the lower vernacular institutions, and to girls' schools. A Department of Public Instruction was organised in every province, under a Director, with a staff of Inspectors. In some respects this scheme may have been in advance of the time; but it supplied a definite outline, which has gradually been filled up. A network of schools was extended over the country, graduated from the indigenous village *páthsálás* up to the highest colleges. All received some measure of pecuniary support, granted under the guarantee of regular inspection; while a series of scholarships at once stimulated efficiency, and opened a path to the university for the children of the poor.

Education Commission of 1882-83.—In 1882-83, an Education Commission appointed by Lord Ripon's Government endeavoured to complete the scheme inaugurated in 1854 by the despatch of Lord Halifax. It carefully examined the condition of education in each province of India, indicated defects, and laid down principles for further development. The results of its labours have been to place public instruction on a broader and more popular basis, to encourage private enterprise in teaching, to give a more adequate recognition to the indigenous schools, and to provide that the education of the people shall advance at a more equal pace along with the instruction of the higher classes. Female education and the instruction of certain backward classes of the community, such as the Muhammadans, received special attention. The general effect of the Commission's recommendations is to develop the Department of Public Instruction into a system of truly national education for India, conducted and supervised in an increasing degree by the people themselves.

Educational statistics, 1878-83.—In 1877–78, the number of inspected schools and colleges of all sorts in British India was 66,202, attended by an aggregate of 1,877,942 pupils, showing an average of one school to every 14 square miles, and one pupil to every hundred of the population. In 1882-83, the number of inspected schools and colleges of all classes in British India had risen to 109,216, with an aggregate of 2,790,773 scholars, showing an average of one school to

*By Act II. of 1857 for Calcutta; by Act XXII. of 1857 for Bombay; and by Act XXVII. of 1857 for Madras.

every 8 square miles of area, and one pupil to every 71 of the population. Male pupils numbered 2,628,402 in 1883, showing one boy at school to every 38 of the male population; and females 162,371, or one girl at school to every 610 females. These figures, however, only include State-inspected or aided schools and pupils. The Census Report of 1881 returned 2,879,571 boys and 155,268 girls as under instruction throughout all India, besides 7,646,712 males and 277,207 females as able to read and write, but not under instruction. The figures are probably below the truth, and it will be remarked that the Census returns the total number of girls attending school at 7,000 less than those attending the State-inspected schools alone.

Educational finance, 1883.—The degree in which education has been popularised, and private effort has been stimulated, may be estimated from the fact that in Bengal the voluntary payments are now far in excess of the Government grants. In 1882-83, the total educational expenditure in British India amounted to £2,105,653, of which £578,629 were contributed by the Provincial Governments, £347,376 were derived from local rates, £63,832 from municipal grants, £93,924 from subscriptions, £49,695 from Native States, £58,675 from endowments, £516,925 from fees and fines, and the remainder from other sources.

The Indian Universities.—The three Universities of Calcutta, Madras, and Bombay were incorporated in 1857, on the model of the University of London. They are merely examining bodies, with the privilege of conferring degrees in arts, law, medicine, and civil engineering. Their constitution is composed of a Chancellor, Vice-Chancellor, and Senate. The governing body, or Syndicate, consists of the Vice-Chancellor, and certain members of the Senate. A fourth University, on a similar plan, but including the teaching element, and following more oriental lines, has been founded at Lahore for the Punjab. The Universities control the whole course of higher education in India by means of their examinations. The entrance examination for matriculation is open to all; but when that is passed, candidates for higher stages must enrol themselves in one or other of the affiliated colleges.

University statistics.—During the ten years ending 1882-83, out of 23,226 candidates at Calcutta, 10,200 successfully passed the entrance examination; at Madras, out of 28,575 candidates, 9,715 passed; and at Bombay, out of 11,871 candidates, 3,557 passed. Total passed entrance examination in the ten years ending 1882-83, 23,472. Many fall off at this stage, and few proceed to the higher degrees. During the same ten years ending 1882-83, 1,036 students graduated as B.A. and only 281 M.A. at Calcutta; 896 B.A. and 22 M.A. at Madras; 56 B.A. and 34 M.A. at Bombay: total of B.A.s and M.A.s in the ten years, 2,725. Calcutta produces the great majority of graduates in law and medicine, while Bombay is similarly distinguished in engineering. In 1882-83, the total expenditure on the Universities was £21,790.

Colleges.—The colleges or institutions for higher instruction may be divided into two classes,—those which teach the Arts course of the Universities, and those devoted to special branches of knowledge. According to another principle, they are classified into those entirely supported by Government, and those which only receive grants-in-aid. The latter class comprises the missionary colleges, together with an increasing number of colleges under native management. In 1882-83, the total number of colleges, including medicine and engineering and Muhammadan *madrasas*, was 96, attended by 8,707 students. Of these, 34 colleges with 3,754 students were in Bengal, 32 colleges with 2,329 students were in Madras, and 9 colleges with 1,203 students were in Bombay. In the same year, the total expenditure on colleges in British India was £173,213, or a fraction under £20 per student.

Upper schools.—The schools include many varieties, which may be sub-divided either according to the character of the instruction given, or according to the proportion of Government aid which they receive. The higher schools are those in which English is not only taught, but is also used as the medium of instruction. They educate up to the standard of the entrance examination at the Universities, and generally train those candidates who seek employment in the upper grades of Government service. One of these schools, known as the *zilá* or district school, is established at the head-quarters station of every district. Many other high schools receive grants-in-aid. The total number of high schools in 1882-83 was 530, of which 492 were for males and 38 for females, the attendance in the year comprising 68,434 males and 1,165 females.

Middle schools.—The middle schools, as their name implies, are intermediate between the higher and the primary schools. Generally speaking, they are placed in the smaller towns or larger villages; and they provide that measure of instruction which is recognised to be useful by the middle classes themselves. Some of them teach English, but others only the vernacular. This class includes the *tahsíli* schools, established at the head-quarters of every *tahsil* or sub-division in the North-Western Provinces. In 1882-83, the middle schools numbered 3,796, with an attendance of 170,642 pupils. In 1882-83, the total expenditure on both higher and middle schools was £491,262.

Primary schools.—The lower or primary schools complete the series. They are dotted over the whole country, and teach only the vernacular tongue. Their extension is the best test of the success of our educational system.

Primary schools in Lower Bengal.—No uniformity prevails in the primary school system throughout the several provinces. In Lower Bengal, up to the last fifteen years, primary instruction was neglected; but since the reforms inaugurated by Sir G. Campbell in 1872, by which the benefit of the grant-in-aid rules was extended to the *páthsálás* or road-side schools, this reproach has been removed. In 1871-72, the number of primary schools under inspection in Lower Bengal was only 2,451, attended by 64,779 pupils. By 1877-78, these schools in Bengal had risen to 16,042, and the number of pupils to 360,322, being an increase of about sixfold in six years. By March 1883, when Sir G. Campbell's reforms had received their full development, the primary schools in Bengal had increased to 63,897, and the pupils to 1,118,623, being an increase of over seventeenfold in the 11 years ending 1882-83. In 1877-78, the expenditure on them from all sources was £78,000; towards which Government contributed only £27,000, thus showing how State aid stimulates private outlay in primary education. The total expenditure in 1882-83 on primary schools in Bengal was returned at £318,680. This increase, however, is more apparent than real, and results from a large number of previously private schools being brought under the inspection of the Education Department, and included in its financial statements.

Primary schools in the North-Western Provinces.—The North-Western Provinces owe their system of primary instruction to their great Lieutenant-Governor, Mr. Thomason, whose constructive talent can be traced in every branch of the administration. In addition to the *tahsíli* or middle schools already referred to, a scheme was drawn up for establishing *halkabandi* or primary schools in every central village (whence their name), to which the children from the surrounding hamlets might resort. The system in the North-Western Provinces has been developed by means of an educational cess added to the land revenue. Sir William Muir, during his long service in the North-Western Provinces, ending in the Lieutenant-Governorship, did much for both the primary and the higher education of the people.

In Bombay, the Primary schools are mainly supported out of local funds raised by a similar cess added to the land revenue.

Primary schools in Burma.—In British Burma, on the other hand, primary education is still left to a great extent in the hands of the Buddhist monks, who receive little or no aid from Government. These monastic schools are only open to boys; but there are also lay teachers who admit girls to mixed classes. The local administration shows a wise disposition to avail itself of the indigenous monastic system. Government has comparatively few schools of its own in Burma, the deficiency being supplied by missionary bodies, working with State aid.

Primary education finance.—In 1882-83, the total expenditure on lower and primary schools throughout British India was £911,121, or a little less than one half of the total educational expenditure of the year (£2,105,653). Under the recommendations of the Education Commission of 1882-83, the importance assigned to primary instruction, and the proportion of the public educational funds devoted to it, will constantly tend to increase. The attendance at primary schools throughout British India amounted to 2½ millions of pupils in 1883.

Girls' schools.—Of late years something has been done to extend the advantages of education to girls. In this, as in other educational matters, the missionaries have been the pioneers of progress. In a few exceptional places, such as Tinnevelli in Madras, the Khási Hills of Assam, and among the Karen tribes of Burma, female education has made rapid strides; for in these localities the missionaries have sufficient influence to overcome the prejudices of the people. But elsewhere, even in the large towns and among the English-speaking classes, all attempts to give a modern education to women are regarded with scarcely disguised aversion, and have obtained but slight success. Throughout the North-Western Provinces and Oudh, with their numerous and wealthy cities, and a total female population of over 21 millions, only 8,999 girls attended school in 1877-78, and 9,602 in 1882-83. In Lower Bengal, the corresponding number was less than 12,000 in 1877-78, but had increased to 57,361 in 1882-83. The total number of girls' schools in 1882-83 in British India was 3,487, attended by 162,317 pupils. This branch of instruction will now, it is hoped, receive a further development from the recommendations of the Education Commission. Efforts were at one time made by the State to utilise the female members of the Vishnuite sects in female education, but without permanent success.

Normal and other special schools.—In 1882-83, the number of normal, technical, and industrial schools throughout India was 213, attended by 8,078 students. Total expenditure in 1882-83, £98,571, or an average of over £12 per head. Schoolmistresses, as well as masters, are trained in these institutions; and here also the missionaries have shown themselves active in anticipating a work which Government subsequently took up. Of schools of art, the oldest is that founded at Madras in 1850, and taken in charge by the Education Department in 1856. This institution, and the Art Schools at Calcutta and Bombay founded on its model, have been successful in developing the industrial capacities of the students, and in training workmen for public employment. Their effect on native art is more doubtful, and in some cases they have tended to supersede native designs by hybrid European patterns. Museums have been established at the provincial capitals and in other large towns. Schools for Europeans have also attracted the attention of Government. Foremost among special schools are the asylums in the hills for the orphans of British soldiers (*e.g.*, Utakámand and Sanáwar), founded in memory of Sir Henry Lawrence.

The Vernacular press.—Closely connected with the subject of education is the steady growth of the vernacular press, which is ever active in issuing both newspapers and books. The missionaries were the first to cast type in the vernacular languages, and to employ native compositors. The earliest vernacular newspaper in Bengali was issued by the Baptist Mission at Serampur in 1818. For many years the vernacular press preserved the marks of its origin, being limited almost exclusively to theological controversy. The missionaries were encountered with their own weapons by the Theistic sect of the Brahma Samáj, and also by the orthodox Hindus. So late as 1850, most of the vernacular newspapers were still sectarian rather than political. But during the last twenty-five years the vernacular press has gradually risen into a powerful engine of political discussion.

Statistics of native journalism.—The number of native newspapers published in the several vernaculars is estimated at 250 to 300, and their aggregate sale at over 250,000 copies.* But the circulation proper—that is, the actual number of readers—is very much larger. In Bengal, the vernacular press suffers from the competition of English newspapers, some of which are entirely owned and written by natives. In the North-Western Provinces and Punjab, from Lucknow to Lahore, about 100 newspapers are printed in Hindustani or Urdu, the vernacular of the Muhammadans throughout India. Many of them are conducted with considerable ability and enterprise, and may fairly be described as representative of native opinion in the large towns. The Bombay journals are about equally divided between Maráthí and Gujarátí. Those in the Maráthí language are characterised by the traditional independence of the race of Sivají; the Gujarátí newspapers are chiefly organs of the Pársís, and of the native trading community. The vernacular newspapers of Madras, printed in Tamil and Telugu, are politically less important, being still for the most part devoted to religion.

Book statistics, 1883.—In 1882-83, the number of books published in India and registered under the Act amounted to 6,198. Of this number, 655 were in English or European languages, 4,208 in vernacular dialects of India, 626 in the classical languages of India, and 709 bi-lingual or in more than one language. Of the total number of published works in 1882-83, 1,160 were returned as educational, and 5,038 as non-educational works. Original works numbered 3,146; re-publications, 2,547; and translations, 505. Publications relating to religion numbered 1,641; poetry and the drama, 1,089; fiction, 238; natural and mathematical science, 281; philosophy and moral science, 160; history, 143; languages, 784; law, 338; and medicine, 235. Politics were represented in 1882-83 by only 11 publications, travels and voyages by only 4, while works classed as miscellaneous numbered 1,231.

* The above estimate must be regarded as the result of intelligent inquiry, and not as an actual enumeration. Steps are now (1885) being taken to procure accurate returns of the vernacular press. But the ephemeral existence of many native newspapers, and other features of vernacular journalism, render the undertaking not free from difficulty.

CHAPTER XIII.

FEUDATORY STATES.

THE subjoined list contains the names of the principal ruling Chiefs in India. Including the rulers of the petty States which have not been separately named, there are 631 Chiefs whose territories comprise what are termed the Feudatory States. These States lie within the territorial limits of British India, to the Government of which and to the Crown of England their relationship has given occasion for the title of 'feudatory.' But the word does not, with any accuracy, describe the position of the several Chiefs.

The degree of independence enjoyed by the rulers, the size, wealth, strength, and importance of the States, present an infinite variety. But they have two features in common. The internal administration of the country, in the absence of exceptional and temporary circumstances, is, to an extent which varies with the measure of independence enjoyed by each State, in the hands of its ruling Chief; but he owns allegiance to the British Government, acknowledges its supremacy, and resigns external negotiations into its hands. Outside the confines of India, speaking geographically, there are Native States likewise having political relations with the British Government of different degrees of intimacy. Such are Baluchistan or Kalat, Las Beyla, Muscat on the Arabian Coast of the Persian Gulf, Afghanistan, Nipal, Bhutan, Sikkim, the statistics of which cannot be given with the same approximation to accuracy as those of the internal States. As regards their external relations they are within the sphere of action of the Indian Government, and by geographical contiguity some are naturally brought into more or less close communion with the people of the bordering districts.

The extent of the feudatory Native States—varying in area as they do from Hyderabad with its 99,518 square miles and twelve and a half millions of population to places like Darkuti in the Punjab, measuring 5 miles and containing 590 souls, or Bija, another petty State in the same province, whose area is 4 miles and whose population numbers 1,158—forms in the aggregate a very considerable part of the continent of India. In a total area which is computed to be 1,462,408 square miles, the feudatory Native States claim nearly 616,250 square miles; and in the total population of India, which, according to the last census of 1881 and other returns, numbers 255,426,793, the Native States own something like 59,046,000.

As the degree of autonomy necessarily varies in so diversified a group of States, so also varies the manner of carrying on their political relationship with the Government. In this respect, however, geographical position has as much effect as political importance, and it will be observed that in the list which is given, the States are divided into those whose relations are carried on directly with the Government of India in the Foreign Department, and those having political relations with the several Local Governments and Administrations of India.

In the first class are included the important States of Kashmir, Hyderabad, Mysore, and Baroda, and the two large groups of States in the central part of India which are collected into the Rajputana Agency and the Central India Agency. In the latter Agency there are no less than 51 States; and they again vary from those of such consideration as are Indore and Gwalior, the countries of the Maharajas Holkar and Sindhia, to some of the most insignificant of small territories.

Those States whose political existence is controlled by Local Governments are situated within the limits of the lands which are contained in the different Governorships, and none of them is of sufficient importance individually for a special officer to be accredited to it by the Government of India, as is, for instance, the case with Mysore. The Kashmir State is exceptionally situated and exceptionally treated. The territories of His Highness the Maharaja of Jamu and Kashmir extend from the lands of the Punjab far into the mountain regions of the Himalayas, and touch on their further side independent and foreign territory; while in area at least this State is the second in India. But from the time when the Maharaja of Jamu was given the lands which British arms had won for him, his connection with the Punjab, before and after its final subjection, has been most intimate; and although a resident officer of the Government of India, having direct communication with that Government, is accredited to the State, there still remain many matters in which the Lieutenant-Governor of the Punjab deals with the Kashmir durbar.

It would be necessary to recount Indian history from the beginning of British power in the peninsula if an explanation were required of the many considerations which guide the Government and the Political Officers serving under it in their dealings with the several States; for their history is as varied as the States themselves. Some have fought side by side with the British arm, and remain to this day preserving the treaty rights which arose in circumstances far different from the present. Some are the remnants of great powers in India who were arrayed against England, whose opposition cost the greater part of their strength, but who saved their existence by submission when to struggle further was useless. Others have arisen from the wreck of kingdoms falling in strife around them, and have at once profited by and added to the strength of the power which dominates them all to-day. And others again so far justify the term applied to them all by being in reality grants of the Crown.

The rights and the internal authority, the ceremonial and other relations of the different States with the paramount power are ordered by the treaties or grants that exist and by old usage and tradition. To regulate them in these respects Political Officers are attached to all, either singly to single States, or to groups of States. But as there is one condition in common to them that they shall have no external relations one with another, or with foreign powers, so there is one advantage common to all, that they are protected from foreign aggression and from internal strife. With the territories of British India the feudatory States form one compact body against a common danger equally protected by the army of England. It is still true that most of the large States possess some military force of their own. A few of them have troops in considerable numbers. In theory it may be unnecessary for any Native State in India to maintain more troops than are required for semi-police duties, or reasonable for purposes of display, but in fact it is a difficult thing to limit to an oriental mind what is reasonable for display: and a pardonable pride prompts several to strive that their consequence, and equally their loyalty, may be made manifest in the equipment of a force which might prove a useful auxiliary to the British arm.

The privilege of immunity from internecine strife necessarily

brings with it the duty of good government; and, loth as the Government of India may be to interfere in the internal affairs of any Native State, instances have occurred in which misgovernment and oppression have demanded interposition in the interests of the people. But the most common instances in which the Government of India asserts the obligation which is imposed upon it, to see that theNative States are fairly conducted, occur when the untimely decease of any ruler is followed by the accession of an infant and the consequent administration of affairs during a minority. Then it is to the interest of the State that rival factions and local partizans be restrained from making its misfortune their opportunity; then the responsibility of the protecting power requires that the helpless should be helped and the weak protected. If in such instances a regency cannot be arranged amongst the relatives of the Chief, or the leading men of the State, the Political Officer assumes much greater power and authority than is his every-day wont. The State is temporarily taken under the administration of an officer appointed by that Government with which its political relations are usually identified, and for the time, until the rightful ruler is of an age to handle the reins himself, the administration is controlled by the Political Officer.

Having Political Relations direct with the Government of India.

Name of State.	Name and title of Chief.	Age of Chief. (Years.)	Area of State in square miles.	Population of State.	Military Force. Cavalry.	Military Force. Infantry.	Military Force. Guns.	Salute of Chief in guns.	Date of succession of Chief.
Baroda	H. H. Maharaja Sayaji Rao Gaekwar.	23	8,570	2,185,005	5,412	9,650	120	21	May 27, '75
Hyderabad	H. H. Nizam Nawab Mir Mahbub Ali Khan, G.C.S.I.	20	*99,518	*12,518,267	5,706	23,258	20	21	Feb. 26, '69
Jamu and Kashmir	H. H. Maharaja Partab Singh.	37	79,784	1,534,972	1,233	15,866	66	19	Sep. 12, '85
Mysore	H. H. Maharaja Cham Rajendra Wadiar, G.C.S.I.	23	†24,723	†4,185,188	1,251	2,390	4	21	Mar. 27, '68

In Central India.

Name of State.	Name and title of Chief.	Age of Chief.	Area of State in square miles.	Population of State.	Cavalry.	Infantry.	Guns.	Salute of Chief in guns.	Date of succession of Chief.
Ajaigarh	H. H. Maharaja Ranjor Singh.	38	802·30	81,454	125	1,000	12	11	Sep. 9, '59
Alirajpur	Maharana Waje Singh	18	836·63	56,827	10	178	7	9	May 31, '82
Barwani	Rana Indarjit Singh	46	1362·25	56,445	13	200	9	9	Aug. 15, '80
Bhopal	H. H. Nawab Shah Jahan Begam, G.C.S.I., C.I.	48	6872·90	954,901	1,400	4,900	57	19	Oct. 31, '68
Bijawar	H. H. Maharaja Pratap Singh.	44	973·56	113,285	100	1,000	12	11	Nov. 22, '47
Charkhári	H. H. Maharaja Mulkhan Singh.	16	787·50	143,015	202	1,549	30	11	July 1, '80
Chhatarpur.	H. H. Raja Vishwanath Singh.	20	1169·34	167,700	100	1,060	39	11	Nov. 4, '67
Datia	H. H. Maharaja Bhawani Singh.	41	836·30	182,698	850	4,120	94	15	Nov. 20, '57
Dhár	H. H. Maharaja Anand Rao, K.C.S.I., C.I.E.	42	1739·68	151,877	270	800	8	15	May '60
Gwalior	H. H. Maharaja Jayaji Rao Sindhia, G.C.B., G.C.S.I., C.I.E.‡	52	28612·43	3,071,524	4,065	12,223	48	21	'43
Indore	H. H. Maharaja Tukaji Rao Holkar, G.C.S.I., C.I.E.	49	8400·11	1,048,842	3,617	7,852	81	21	June 27, '44
Jaora	H. H. Nawab Muhammad Ismail Khan.	31	581·28	120,077	123	841	15	13	Apl. 30, '65
Jhabua	H. H. Raja Gopal Singh.	45	1336·48	93,406	30	300	4	11	'41
Narsingarh.	H. H. Raja Pratap Singh	36	622·88	112,427	326	450	18	11	Apl. 1, '73
Orchha (or Tehri).	H. H. Maharaja Pratap Singh.	32	1933·74	311,514	450	5,200	90	17	Mar. 15, '74
Panna	H. H. Maharaja Pratap Singh, K.C.S.I.	38	2568·33	227,306	250	1,800	29	13	June 9, '70
Rajgarh	H. H. Raja Balbhadar Singh.	27	655·36	122,641	300	540	6	11	July 7, '82
Ratlam	H. H. Raja Ranjit Singh	26	728·96	87,314	150	642	5	13	Jan. 28, '64
Rewah	H. H. Maharaja Vyankatesh Raman Singh.	10	10083·	1,305,124	712	1,583	55	17	Feb. 6, '80

And one hundred and seventeen Chiefs having less than 500 square miles of territory.

In Rajputana.

Name of State.	Name and title of Chief.	Age of Chief.	Area of State in square miles.	Population of State.	Cavalry.	Infantry.	Guns.	Salute of Chief in guns.	Date of succession of Chief.
Alwar	H. H. Maharao Raja Mangal Singh.§	27	3,024	682,926	2,098	4,218	346	15	Dec. 18, '74
Banswara	H. H. Maharawal Lachman Singh.	47	1,500	152,045	656	589	8	15	'42
Bhartpur	H. H. Maharaja Jaswant Singh, G.C.S.I.	35	1,974	645,540	1,878	7,951	38	17	July 8, '53
Bikanir	H. H. Maharaja Dungar Singh.	32	22,340	509,021	803	1,610	57	17	Aug. 11, '72
Bundi	H. H. Maharao Raja Ram Singh, G.C.S.I., C.I.E.	75	2,300	254,701	446	1,835	144	17	July 15, '21
Dholpur	H. H. Maharaj Rana Nihal Singh.‖	23	1,200	249,657	525	1,625	33	15	Feb. 10, '73
Dungarpur	H. H. Maharawal Udai Singh.	45	1,000	153,381	251	711	4	15	'44
Jaipur	H. H. Maharaja Madho Singh.	25	14,465	2,534,357	3,578	16,099	281	17	Sep. 18, '80
Jaisalmir	H. H. Maharawal Bairi Sal Singh.	38	16,447	108,143	500	400	12	15	June 17, '64
Jhalawar	H. H. Maharaj Rana Zalim Singh.	21	2,694	340,488	477	4,032	94	15	June 24, '76
Jodhpur	H. H. Maharaja Jaswant Singh, G.C.S.I.	49	37,000	1,750,403	3,192	4,040	121	21	Feb. 13, '63
Karauli	H. H. Maharaja Arjun Pal	63	1,208	148,670	276	1,687	40	17	Jan. 1, '76
Kishengarh.	H. H. Maharaja Sardul Singh.	32	724	112,633	499	2,000	51	15	Dec. 26, '79
Kotah	H. H. Maharao Satru Sal Singh.	47	3,797	517,275	942	5,508	148	17	Apl, 28, '66
Partabgarh	H. H. Raja Udai Singh	39	1,460	79,568	390	449	4	15	Mar. 30, '64
Sirohi	H. H. Rao Kesri Singh	28	3,020	142,903	103	500	8	15	Sep. 16, '75
Tonk	H. H. Nawab Muhammad Ibrahim Ali Khan.	37	2,509	338,029	491	2,388	77	17	Dec. 20, '67
Udaipur	H. H. Maharana Fateh Singh.	36	12,670	1,494,220	1,304	5,964	128	19	Dec. 24, '84

And two Chiefs having less than 500 square miles of territory.

Having Political Relations direct with the Government of Fort St. George.

Name of State.	Name and title of Chief.	Age of Chief.	Area of State in square miles.	Population of State.	Cavalry.	Infantry.	Guns.	Salute of Chief in guns.	Date of succession of Chief.
Cochin	H. H. Raja Rama Varma, K.C.S.I.	51	1,361	600,278	16	327	4	17	Mar. 28, '64
Pudukota	H. H. Raja Rama Chandra Tondiman.	57	1,101	302,127	21	3,605	26	11	July 13, '39
Travancore	H. H. Maharaja Rama Varma.	29	6,730	2,401,158	60	1,412	6	19	Aug. 4, '85

And two Chiefs having less than 500 square miles of territory.

Having Political Relations direct with the Government of Bombay.

Name of State.	Name and title of Chief.	Age of Chief.	Area of State in square miles.	Population of State.	Cavalry.	Infantry.	Guns.	Salute of Chief in guns.	Date of succession of Chief.
Baria	Raja Man Singhji	30	813	52,421	39	217	...	9	'64
Bhaunagar	H. H. Rawal Takht Singhji, Jaswat Singhji, G.C.S.I.	28	2,784	403,754	550	2,200	15	15	Apl. 13, '70
Bhor	Pant Sachiv Shankar Rao Chimnaji.	32	1,491	145,872	...	...	...	*Nil*	Feb. 12, '71
Chhota Udaipur	Raja Moti Singhji	27	873	62,913	50	276	...	9	July 7, '81
Dharampur.	Raja Narayan Deoji Ram Deoji.	46	794	101,115	40	163	3	9	Mar. 8, '60
Dhrangadra.	H. H. Raj Sahib Mansinghji Ranmal Singhji, K.C.S.I.	49	1,156	99,686	355	872	9	11	Oct. 16, '69
Gondal	Thakur Bhagwat Singhji Sagramji.	21	1,087	13,524	184	922	65	9	Dec. 14, '69
Idar	H. H. Maharaja Kesri Singhji Jawan Singhji.	24	2,500	217,382	54	100	21	15	Dec. 26, '68
Jath	Daple Amritrao Rao Sahib	52	885	49,486	...	...	...	*Nil*	July 28, '41
Jawhar	Raja Malhar Rao	41	534	48,556	...	...	...	"	'65
Junagarh	H. H. Nawab Bahadur Khanji Muhabbat Khanji	30	3,283	387,499	1,270	3,750	56	11	Sep. 29, '82
Khairpur	H. H. Mir Ali Murad Khan	71	6,109	129,153	700	774	14	17	'42
Kolhapur	H.H. Raja Shahaji Bhonsla Chhatrapati.	12	2,816	800,189	155	1,502	63	19	Mar. 17, '84
Kutch	H. H. Rao Khengarji	20	6,500	512,084	351	1,764	164	17	Jan. 1, '76
Morvi	H. H. Thakur Waghji Rawaji.	28	740	80,964	102	1,099	17	11	'70
Nawánagar.	H. H. Jam Vibhaji Ranmalji, K.C.S.I.	59	3,791	316,147	282	2,821	117	15	'52
Pálanpur	H. H. Diwan Sher Muhammad Khan.	34	3,150	236,461	294	697	80	11	Aug. 28, '77
Porbandar	H. H. Rana Vikramatji Khimaji.	67	566	71,072	275	650	24	11	'31
Rádhanpur	H. H. Nawab Muhammad Khanji.	43	833	91,579	248	362	10	11	Oct. 9, '74
Rájpipla	H. H. Raja Ghambhir Singhji.	40	1,514	120,036	82	357	...	11	'60
Sángli	Sahib Dhundi Roa Chintaman.	46	1,049	196,382	43	400	4	*Nil*	'51
Sawantwari.	Raja Raghunath Sawant Bhonsle.	24	900	174,133	12	463	34	9	Mar. '69
Tharad Morwara	Thakur Waghela Khongar Singhji.	50	940	65,494	50	30	...	*Nil*	'60

And three hundred and forty-five Chiefs having less than 500 square miles of territory.

* Includes the Hyderabad Assigned Districts.
† Includes Bangalore.
‡ This Chief is an Honorary General in the British Army.
§ This Chief is an Honorary Lieutenant-Colonel in the British Army.
‖ This Chief is an Honorary Major in the British Army.

Having Political Relations direct with the Government of Bengal.

Name of State.	Name and title of Chief.	Age of Chief. (Years)	Area of State in square miles.	Population of State.	Military Force: Cavalry.	Military Force: Infantry.	Military Force: Guns.	Salute of Chief in guns.	Date of succession of Chief.
Athmallik	Raja Mahendra Deo Sawant.	39	730	21,774	...	...	1	*Nil*	Jan. 20, '77
Bod .	Raja Jogendra Deo .	28	2,064	71,144	...	...	2	,,	Oct. 6, '79
Bonai .	Raja Inder Deo . .	49	1,297	24,026	...	...	...	,,	Sep. 12, '76
Chang Bakhar.	Bhya Balbhadar Singh .	60	906	13,466	...	...	...	,,	
Daspalla .	Raja Chaitan Deo Bhanj .	32	568	41,608	...	...	5	,,	Jan. 21, '73
Dhenkánal	Raja Surji Pratap Mahendra.	1	1,463	208,316	...	...	8	,,	Aug. 28, '85
Gangpur .	Raja Raghunath Sikhar Deo.	33	2,484	107,985	...	...	...	,,	'58
Jashpur .	Raja Pratap Narain Singh Deo.	54	1,947	90,240	...	...	2	,,	Oct. 24, '45
Keunjhar .	Maharaja Dhanurjai Narayan Bhanj Deo.	37	3,548	230,499	...	...	28	,,	'61
Korea .	Raja Pran Singh Deo .	30	1,631	29,846	...	...	...	*Nil*	'65
Kuch Behar .	H. H. Maharaja Nripendra Narayan.*	24	1,307	602,624	7	116	4	13	Aug. '63
Mayurbhanj.	Raja Sriram Chandra Bhanj.	15	4,243	385,737	...	...	11	*Nil*	May 29, '82
Nayagarh	Raja Ludu Kishor Singh Mandhata.	43	581	114,622	...	...	9	,,	Sep. 20, '54
Sarguja .	Raja Raghunath Sarun Singh.	25	6,103	270,336	...	...	1	,,	Mar. 25, '76
Tipperah, Hill.	H. H. Maharaja Bir Chandra Barman.	48	4,086	95,637	...	440	10	13	'70
Udaipur .	Raja Dharmjit Singh .	29	1,051	33,955	...	...	3	*Nil*	'76

And ten Chiefs having less than 500 square miles of territory.

Having Political Relations direct with the Government of the North-Western Provinces and Oudh.

Name of State.	Name and title of Chief.	Age of Chief.	Area of State in square miles.	Population of State.	Cavalry.	Infantry.	Guns.	Salute of Chief in guns.	Date of succession of Chief.
Rampur .	H. H. Nawab Muhammad Kalb Ali Khan, G.C.S.I., C.I.E.	53	945	541,914	600	2,196	28	15	'64
Tehri (Garhwal).	H. H. Raja Pratap Sah .	34	4,163	199,836	...	...	...	11	Dec. 6, '71

Having Political Relations direct with the Government of the Punjab.

Name of State.	Name and title of Chief.	Age of Chief.	Area of State in square miles.	Population of State.	Cavalry.	Infantry.	Guns.	Salute of Chief in guns.	Date of succession of Chief.
*Bahawalpur.	H. H. Nawab Sadik Muhammad Khan, G.C.S.I.	24	15,000	573,494	257	957	11	17	Mar. 25, '66
Bashahr .	Raja Shamsher Singh .	48	3,320	64,345	...	100	2	*Nil*	'49
Chamba .	H. H. Raja Sham Singh .	20	3,180	115,773	...	188	2	11	'73
Faridkot .	H. H. Raja Bikrama Singh	44	612	97,034	26	366	6	11	Apl. 22, '74
Jind .	H. H. Raja Raghbir Singh, G.C.S.I., C.I.E.	54	1,232	249,862	462	1,266	18	13	Jan. 26, '64
Karpurthala.	H. H. Raja Jagat Jit Singh	14	620	252,617	185	1,237	13	11	Sep. 5, '77
Mandi .	H. H. Raja Bijai Sen .	41	1,000	147,017	35	1,600	6	11	Jan. 26, '51
Nábha .	H. H. Raja Hira Singh, G.C.S.I.	43	928	261,824	467	1,196	18	13	'71
Patiala .	H. H. Maharaja Rajendra Singh.	14	5,887	1,467,433	2,513	4,939	109	17	Apl. 14, '76
Sirmur (Nahan)	H. H. Raja Shamsher Prakash, K.C.S.I.	43	1,077	112,371	54	335	10	11	'56

And twenty-three Chiefs having less than 500 square miles of territory.

Having Political Relations direct with the Chief Commissioner of the Central Provinces.

Name of State.	Name and title of Chief.	Age of Chief.	Area of State in square miles.	Population of State.	Cavalry.	Infantry.	Guns.	Salute of Chief in guns.	Date of succession of Chief.
Bamra .	Raja Sudhal Deo . .	38	1,988	81,286	...	...	...	*Nil*	May 12, '69
Bastar .	Raja Bhairam Deo . .	47	13,062	196,248	12	50	3	,,	'53
Kanker .	Maharaja Narhar Deo .	36	639	63,610	...	...	...	,,	'53
Kárond or Kala Handi.	Raja Raghu Keshar Deo .	14	3,745	224,548	...	1,556	1	9	Apl. 19, '81
Kawarda .	Thakur Rajpal Singh .	37	887	86,362	...	...	...	*Nil*	'66
Khairagarh.	Zamindar Lal Umrao Singh	41	940	166,138	...	...	...	,,	'82
Nandgaon	Mahant Balram Das .	21	905	164,339	...	...	...	,,	Nov. 4, '83
Patna .	Maharaja Ram Chandra Singh.	14	2,399	257,959	...	...	...	*Nil*	Nov. 25, '78
Raigarh-Bargarh.	Raja Ghansham Singh .	62	1,486	128,943	...	...	...	,,	Dec. 4, '63
Rairakhol	Raja Bisham Chandra Janamuni.	67	833	17,750	...	...	...	,,	'25
Sarangarh	Raja Bhawani Pratap Singh.	21	540	71,274	...	...	...	,,	June 5, '72
Sonpur .	Raja Niladhar Sing Deo .	47	906	178,701	...	...	...	,,	'40

And three Chiefs having less than 500 square miles of territory.

Having Political Relations direct with the Chief Commissioner of Assam.

Name of State.	Name and title of Chief.	Age of Chief.	Area of State in square miles.	Population of State.	Cavalry.	Infantry.	Guns.	Salute of Chief in guns.	Date of succession of Chief.
Manipur .	Maharaja Kirti Chandra Sing, K.C.S.I.	53	8,000	221,070	400	6,049	10	*Nil*	'50

And nineteen Chiefs having less than 500 square miles of territory.

* This Chief is an Honorary Major in the British Army.

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